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WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.

T. R. BILLUPS, F.E.S.

W. LUCAS DISTANT, F.E.S., &c.

EDWARD A. FITCH, F.L.S., F.E.S.

F. W. FROHAWK, F.E.S.

MARTIN JACOBY, F.E.S.

W. F. KIRBY, F.L.S., F.E.S.

J. H. LEECH, B.A., F.L.S., F.E.S.

DR. D. SHARP, F.R.S., F.E.S., &c.

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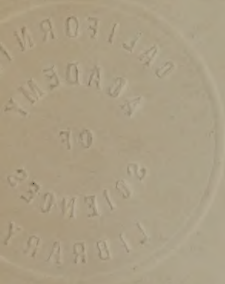
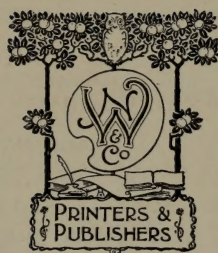
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SUBSCRIPTIONS FOR 1896 ARE NOW DUE.

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[No. 392.

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THE

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OF

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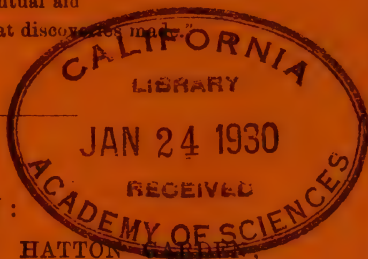
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ABERRATION OF *ARCTIA CAIA*.



THE above figure represents a very striking aberration of *A. caia*, which has been kindly lent me for the purpose of figuring, by Mr. P. M. Bright.

The primaries are of normal colouring, but most of the usual markings are so greatly reduced in size, and others merely indicated by spots, that it gives the specimen a very pretty and striking appearance. The secondaries are of a rose-pink orange; the usual blue-black markings are much diminished in size, and clearly outlined with lemon-yellow; the central spots of normal specimens are missing (excepting a small black speck on the right wing), and replaced by lemon-yellow blotches; the red thoracic collar is also missing, and the black abdominal bands are reduced to three.

A somewhat similar aberration is figured by Millière, Plate LIII., fig. 7; in this the markings of the primaries are greatly reduced, and principally only represented by a few dots, the boldest markings being along the hind margin; the secondaries are very like those of the specimen figured above, but of paler ground colour. Another example of this type of variation is in the collection of Mr. C. A. Briggs, and is figured in the Entom. vol. xxi., p. 73, which has only the median markings of primaries represented, and the secondaries are unspotted.

Turning to the 'Entomologist' for January, 1892, we find an entirely opposite variety figured. In this specimen the primaries are wholly smoky brown, with the exception of three small white spots on the right side and two on the left; the secondaries are more heavily marked than usual. Mr. Bright possesses a similar but more melanic specimen, in which the primaries are entirely brown and the secondaries velvety black, with rose-orange tawny along the costal area and pinkish orange on the inner margin.

F. W. FROHAWK.

December, 1895.

CARPOCAPSA POMONELLA A NUT-FEEDER.

BY ROBERT ADKIN, F.E.S.

It is upwards of a century and a half since attention was called to *Carpocapsa pomonella* as an enemy to the apple crop, and during recent years, apple-growing having become an important industry, more particularly in America and the Australian colonies, an enormous amount of evidence has been recorded regarding it. That the larva should be found to infect pears, and even the berries of the white beam-tree (*Pyrus aria*) (Proc. South Lond. Ent. Soc., 1888, p. 64), does not seem to have surprised any one; but the statement that it also attacked certain kinds of nuts appears to have been received by many with considerable doubt.

Wishing to satisfy myself on the point, I have for some years past kept a look-out for any nut-feeding lepidopterous larvæ, and hardly an autumn has passed without a few being found in walnuts; but although every possible care was taken with them, it was not until the present year that I was successful in rearing an imago, the disturbance of the larva in opening the nut probably being the cause of failure.

In the autumn of 1894 some walnuts that were sent to table were found to be infected to the extent of about six or seven per cent. of their number, but, unfortunately, the majority of them had been badly crushed before my attention was called to the presence of the larvæ. I, however, secured those that were least injured, and having satisfied myself that the larvæ were all of one species, I put the nuts together again as neatly as I could, placed them in a glass jar with some sand to await results, and was rewarded by rearing a fine example of *C. pomonella* in July last. A subsequent examination of the nuts showed that the moth was reared from one the shell of which had been but little broken, and the kernel disturbed only so far as was necessary for the examination of the larva; in all the others, which were more or less badly crushed, the remains of dead larvæ only were found. The skin of the pupa, from which the moth had emerged, was found projecting

from a broken portion of the nut-shell. The species has also been bred frequently from sweet-chestnuts, as well as from walnuts, by Mr. W. West (Proc. South Lond. Ent. Soc., 1890, p. 48; Entom. xxviii. 345).

It will be noted that the only two species of nuts from which, as far as we know, *C. pomonella* has been reared, viz., walnuts and chestnuts, have the seeds (i. e. nuts) completely enveloped in fleshy husks: is it possible that this fact can account for foods so widely different, in other respects, from the apple being voluntarily selected? or was *pomonella*, like so many of the other species of *Carpocapsa*, originally a nut-feeder, and its predilection for apples a recently acquired taste? If the latter, and more probable, should be the correct solution, we have little to fear from the ravages of this species to our nut crops.

4, Lingards Road, Lewisham, December, 1895.

THE KILLING AND PRESERVATION OF INSECTS.

BY H. GUARD KNAGGS, M.D., F.L.S.

IN your November and December issues, two correspondents, Messrs. Fountain and Stafford Chope (Entom. xxviii. 303, 332), respectively attribute to me the opinion that grease is the result of decomposition, i. e. of "ordinary decomposition" or putrefaction. I am not aware of having ever made such a statement, and do not believe that insects *do* putrefy under the usual conditions of being converted into specimens. Some time ago a friend asked me if I could account for the *Catocalæ* going putrid, and also if I could tell him how to prevent it. Not having heard of this offensive characteristic, I was unable at the time to suggest a remedy. As I could find no one who had met with a like disagreeable experience, and as the question haunted me persistently, I again paid my friend a visit, when we had a conversation somewhat in this style: "In which species of *Catocala* did you say you observed the objectionable property?" "In *promissa* and *sponsa*." "Was it a wet season when they were captured?" "No, the reverse." "Did you capture them yourself?" "No, they were sent up to me from the New Forest." "In a relaxing box?" "Yes." "There you are: damp was the solution of the enigma, for under ordinary circumstances the natural moisture of the insect would pass off into the dry atmosphere of a well-ventilated room, and desiccation would result. Putrefaction could hardly take place unless an unusual amount of humidity were present, either inherent in the specimen, or in the surrounding atmosphere."

As for grease itself being decomposed, there can be no doubt but that soon after exposure to the air it becomes oxidised, and rancidity ensues, with the formation, amongst other products, of

butyric acid, which has a repulsive odour, though hardly that of putrefaction.

I do not believe in any method of preventing the formation of grease, unless it be, when rearing larvæ, to feed them on a sort of Banting system; or, with newly emerged imagines, to get them to pair, lay, and fly,—all rather risky proceedings in view of prospective specimens. But there can be little doubt as to the external appearance of grease being delayed in many cases for an indefinite period, it may be for years, and it may be for ever, by keeping the setting-house and cabinets in a cool, dry, well-ventilated room.

Not having used lime hydrate as an absorbent for grease, I can offer no decided opinion upon its merits, but should imagine that its strong alkaline and somewhat caustic qualities would render it useless for the purpose; surely magnesia carbonate is lighter, more absorbent, non-corrosive, and therefore less likely to injure the specimen. Again, these powders only act in a superficial way, they do not extract grease from the interior. To do this, repeated soakings in benzine collas or methylated ether, as recommended by Messrs. Arkle, and Christy, and in the case of the latter fluid, by myself (*Entom.* xxvi. 32, 109, 217; xxvii. 6), should be resorted to in the first instance; after which, if considered necessary, the powder may be applied.

There are one or two remarks I should like to offer on the subject of killing, supplemental to Mr. Stafford Chope's paper. Firstly, the burnets appear to be proof against the cyanide bottle; to use my friend Auld's expression, they positively revel in it; and my friend Sydney Webb tells me that, in their case, it actually conduces to amateness, so that when he wants *Zygænæ* to pair, he pops them into the cyanide bottle with the happiest results. Secondly, it is not generally known that a puncture with vinegar is almost, if not quite, as deadly as one with oxalic acid, and of course the agent is of a harmless nature to the operator; but to me all acids seem to be objectionable. The nicotine from a foul pipe, as suggested, is very effectual, but we are not all smokers; a strong decoction of tobacco, as used by gardeners, is better. It should be kept in a small phial, to the cork of which should be attached, either a sharp-pointed grooved needle, or a sewing-machine needle; or, better still, a fine crow-quill steel pen from which one of the nibs has been broken off; an ordinary needle would leave the greater part of the poison outside the insect, and consequently its action would be much diminished.

Last season I tried a strong tincture of tobacco, mixed with an equal proportion of concentrated infusion of quassia, and it killed quickly; but until I have tried it more extensively on burnets, I don't like to praise it up too much. Next season, if all goes well, I intend to go collecting burnets; and if I can find

a fluid which will despatch *them* with rapidity, it seems to me that it ought to kill anything—in the insect way.

There are other points, in the paper referred to, which I should like to have touched upon, but I have already taken up too much of your space.

189, Camden Road, N.W.

DESCRIPTIONS OF SOME NEW SPECIES OF PHYTOPHAGOUS COLEOPTERA FROM THE LOO-CHOO ISLANDS.

BY MARTIN JACOBY, F.E.S.

AMONGST a small number of Phytophaga kindly sent to me by Mons. R. Oberthur, which he received from the island of Oshima, there are several species which seem to be new to science. The fauna of these islands is, of course, closely allied to that of Japan, with which it seems to have many species in common. I recognised *Crioceris subpolita*, Motsch., *Chrysomela aurichalcea*, Motsch., and *Cryptocephalus perelegans*, Baly. The following species appear to be undescribed:—

GYNANDROPHALMA QUADRATOMACULATA, n. sp.

Black below, as well as the head; thorax and legs fulvous, the former impunctate; scutellum black; elytra testaceous, with four small black spots near the suture (♂), or three additional spots at the sides. Length, 2 lines.

♂. Head broad, black, finely rugose between the eyes and strigose in front of the latter; anterior margin of the epistome narrowly fulvous, triangularly emarginate; antennæ fulvous, the five apical joints fuscous, thickened, third and fourth small, equal; thorax strongly transverse, of equal width, the anterior margin straight, the posterior one slightly produced into a lobe at the middle, the sides much rounded at the base, the surface with a transverse depression near the anterior margin and some other indistinct ones near the posterior angles, impunctate, with the exception of a few punctures near the base; scutellum black, its apex distinctly raised; elytra parallel, pale flavous or testaceous, finely punctured, the punctures here and there placed in irregular rows, with four small black spots placed quadrately near the suture, before and at the middle; the under side (that of the thorax excepted) black; legs fulvous, the first joint of all the tarsi elongate.

In the female, the head is, as usual, smaller, and the thorax is less transverse, the spots on the elytra are larger, especially those of the second row which form the square, and, in addition, three others are placed at the sides, one on the shoulder, a very small one immediately below, and the third in a line with the last subsutural spot.

This species differs in the pattern of the elytra from any of its allies with which I am acquainted.

CHLAMYS GENICULATA, n. sp.

Black; the antennæ and tarsi fulvous; thorax with four longitudinal ridges in front, the base raised, broadly channelled, interstices closely punctured; elytra with two longitudinal ridges joined below the middle, the apex with two short ridges, interstices punctured like the thorax. Length $1\frac{1}{4}$ line.

Subcylindrical and parallel, black; the head flat, strongly and rather closely punctured, the lower portion rugose; the eyes deeply notched; labrum and palpi fulvous; antennæ with the apical five joints transverse, entirely fulvous, the third and fourth joints slender, equal; thorax strongly raised posteriorly into a hump, the hinder portion of which is deeply divided and transversely wrinkled, the top of each division having a strongly-curved S-shaped ridge, which extends downwards at each side towards the front, the latter also furnished with two ridges at the middle, running towards the anterior margin; a tubercle is also placed near the lateral margins, the entire interstices strongly punctured and wrinkled; scutellum strongly transverse; elytra sculptured like the thorax, the suture finely dentate; a strongly-raised ridge extends from the middle of the base below the middle and, curving round, runs upward again to the base near the suture; the sides are furnished with three short transverse ridges at nearly equal distances, and the apex has another very short slightly curved ridge near the suture, as well as a tubercle near the lateral margin; deep punctures and wrinkles fill up all the interstices; legs rather slender, the knees and the tarsi fulvous; under side closely and strongly punctured; prosternum very broad anteriorly, terminating into a narrow acute ridge, closely punctured.

The species may be distinguished principally by the colour of the antennæ, knees and tarsi, and by the very conspicuous ridge of the elytra, which at its apex turns abruptly round, running upwards again near the suture.

COLASPOSOMA OBERTHURI, n. sp.

Brownish cupreous; antennæ black, the basal joints fulvous; head rugose; thorax closely and strongly punctured, the sides rugosely punctate; elytra strongly punctured in closely-arranged rows, the sides transversely rugose. Length, $2-2\frac{1}{4}$ lines.

Of bronze colour; the head closely rugose-punctate throughout, the vertex strigose, the strigæ extending to the middle of the head; antennæ extending a little beyond the base of the thorax, black, the lower six joints fulvous, the third joint longer than the fourth; thorax rather short, more than twice as broad as long, the sides evenly rounded, the surface very closely and strongly punctured, the interstices at the sides rugose or wrinkled, often confluent; scutellum not broader than long, with some distinct punctures; elytra scarcely perceptibly depressed below the base, as strongly punctured as the thorax, the punctures arranged in rather close and irregular rows, of which three near the suture towards the apex are more regular than the rest, the punctures below the shoulders and at the sides larger and closer placed, the interstices at the same places but slightly rugose; legs coloured like the upper side.

From the many other Eastern species of the genus the present one may be known principally by the very closely punc-

tured and rugose head, in which the clypeus is scarcely separated from the face, the whole upper portion of which is covered with oblique strigæ; the sides of the thorax are also more closely punctured and rugose than most of the other Eastern species with which I am acquainted, and the punctuation of the elytra is very strong; in the female, the elytral rugosities are, as usual, much stronger, forming transverse wrinkles to the middle of the elytra at the sides, where there is also a narrow longitudinal costa visible.

CORYNODES JAPONICUS, sp. n.

Metallic green; head remotely punctured; thorax very convex, the disc closely and finely punctured; elytra with basal depression, strongly punctured in closely approached rows, claws appendiculate. Length 4-5 lines.

Of nearly parallel and subcylindrical shape; the head with a central groove, strongly but not closely punctured; the clypeus separated from the face at the sides by a short groove not extending to the middle, broader than long, its surface rugosely punctured; mandibles broad, their apex truncate, piceous as well as the palpi; antennæ extending a little beyond the base of the elytra, the lower six joints metallic, stained with fulvous, the others purplish, forming a broad five-jointed club, the apex of the terminal joint acute; thorax very convex, swollen in front, about twice as broad as long, the sides strongly rounded, widest at the middle, the angles acute but not much produced, the surface closely impressed with larger and smaller punctures, the space near the margins nearly impunctate; scutellum purplish; elytra with a distinct transverse depression below the base, the shoulders prominent, tuberculiform, the punctuation moderately strong, arranged in closely approached rather regular rows, the sides with narrow, purplish reflexed margins; tibiæ strongly rugose, the tarsi strongly widened; prosternum longer than broad, rugose.

The above description is that of the male, which, on account of the anteriorly swollen thorax, resembles a species of *Chrysomus* rather than a true *Corynodes*; this convexity is less noticeable in the female. The peculiar shape of the thorax at once distinguishes the present species, the first *Corynodes* known from this locality. Mons. Oberthur has received numerous specimens, of which he kindly sent me several for examination.

SEBÆTHE FLAVOLIMBATA, n. sp.

Flavous, the antennæ (the basal joints excepted) and the tarsi black, thorax impunctate; elytra microscopically punctured, bluish black, the lateral and apical margins flavous. Length 2 lines.

Head impunctate, the frontal elevations strongly raised, transverse; carina in shape of an acute perpendicular ridge; palpi flavous, incrassate; antennæ extending to the middle of the elytra, black, the lower two joints flavous, third joint slightly shorter than the fourth; thorax nearly three times broader than long, the sides strongly rounded with a rather broad flattened margin, the angles thickened, the surface with a broad but shallow depression at the base, the sides also more or less obsoletely

depressed, the disc impunctate, flavous; scutellum triangular, flavous; elytra metallic bluish-black, the lateral margin flattened and reflexed, flavous, the apex to a slightly broader extent of the same colour; under side and legs flavous; tarsi black.

Easily recognisable by the system of its coloration.

MORPHOSPHERA CÆRULEA, n. sp.

Flavous; the head, antennæ, tibiæ and tarsi black; thorax with four black spots, minutely punctured; elytra metallic blue, extremely closely punctured. Length $3\frac{1}{2}$ lines.

Of broadly ovate shape; the head with a few extremely minute punctures, black, with a slight bluish tint, the frontal elevations flattened, trigonate; antennæ extending to the base of the elytra only, black, the lower three joints stained with fulvous, second and third joints small, the third slightly longer, fourth and following joints pubescent; thorax nearly three times broader than long, the anterior margin concave, the sides rounded, anterior angles obtusely thickened, the surface extremely finely and rather sparingly punctured, flavous, the disc with four black spots, placed transversely at the middle, at equal distances; scutellum black, shining, elytra metallic bright blue, extremely closely and finely punctured; under side and the femora flavous; tibiæ mucronate, black as well as the tarsi, the first joint of the posterior tarsi as long as the following three joints together, claws appendiculate, anterior coxal cavities open.

This species nearly resembles in coloration the type *M. maculicollis*, Baly, but in that insect the antennæ are as long as the body, the colour of the under side is black, and the elytra are much more strongly punctured; the general size is also much larger.

MALAXIA ELONGATA, n. sp.

Flavous; the vertex of the head, the antennæ and the breast black; thorax strongly punctured, bifoveolate at the sides; elytra metallic green, finely granulate and pubescent. Length 3 lines.

Very elongate; the head rugose at the vertex, the latter black, lower portion of face flavous, the frontal tubercles rather obsolete; clypeus deflexed anteriorly; antennæ extending to the middle of the elytra, black, the lower three joints flavous below, the fourth one-half longer than the third joint; thorax flavous, twice as broad as long, narrowed at the middle, the sides rounded anteriorly, the anterior angles in shape of a small tubercle, the surface rather deeply foveolate at the sides, the centre more shallowly depressed, scarcely punctured, the sides strongly and closely punctured; elytra very elongate, metallic green, finely granulate and closely covered with very short flavous pubescence; legs and abdomen flavous; breast black.

This is the most elongate and largest species of the genus known to me.

CONTRIBUTIONS TO THE GEOGRAPHICAL DISTRIBUTION OF THE RHOPALOCERA IN THE ALPS.

BY W. HARCOURT-BATH.

As already announced (Entom. xviii. p. 258), I undertook a very successful entomological collecting expedition to the Pennine and Bernese Alps and Jura during the first half of July last year (1895). In the note referred to I find that I slightly underestimated the number of species of Rhopalocera which I obtained. The number of species which I observed was ninety-nine, and the sum-total actually captured amounted to ninety-seven, which figures, I venture to flatter myself, rank among the highest on record for the brief period of a fortnight, in the region under consideration. This result was owing to two circumstances, namely, favourable weather during most of the time, combined with the considerable number of different localities visited affording a variety of geological and climatological conditions.

The first four days and a half were occupied in traversing the district between Spiez, on the Lake of Thun, and Loèche-Ville, in the Rhone Valley, over the celebrated Gemmi Pass, with its glorious panorama of Alpine scenery. I then went on by rail to Zermatt, where four more days were passed, in full view of the mighty Matterhorn and all the great giants of the Pennine range. The remainder of the period, four days, was spent in the St. Niklaus Thal, in the Rhone Valley at Aigle and Le Sepey, and on Chaumont, above Neuchâtel, in the Jura. Three days and a half were absorbed in travelling to Switzerland and back, *viâ* Paris and Pontarlier.

The following is a list of the Rhopalocera encountered, with localities and notes on abundance, scarcity, &c. :—

PAPILIONIDÆ (4 species).

Papilio podalirius. St. Niklaus. Captured a female in the act of ovipositing on Alpine barberry. — *P. machaon*. Kandersteg, not uncommon.

Parnassius apollo. Abundant in most of the localities enumerated: Inden, Zermatt, Zmutt Thal, Randa, St. Niklaus, Stalden, Aigle, Le Sepey, Les Verrières and Chaumont, near Neuchâtel; very large specimens occurred at the latter. — *P. delius*. Kandersteg, not uncommon; Loèche-les-Bains, Zmutt-Thal, Riffel Alp, Staffei Alp, Gemmi Pass.

PIERIDÆ (13 species).

Aporia craetgi. Very plentiful at Spiezwyler, Mühlenen, Reichenbach Kandersteg, Loèche-les-Bains, Inden, Zermatt, Zmutt-Thal, Randa, St. Niklaus.

Pieris brassicæ. Nowhere plentiful except at Loèche-les-Bains. — *P. rapæ*. Not very abundant except at Aigle. — *P. napi*. Kandersteg, Gemmi Pass, Zermatt, Zmutt-Thal, Riffel Alp. — Var. *bryonia*. Plentiful at Kandersteg and on the Gemmi Pass; also an androgynous aberration as announced (Entom. xviii. p. 258). — *P. callidice*. Very abundant on the

Gemmi, especially in the neighbourhood of the Dauben See, near the summit of the pass, where a white species of ranunculus was flowering in profusion; also, less commonly, on the Riffel Alp and the Riffel Berg.

Euchloë belia var. *simplonia*. Single specimens on the Gemmi Pass, the Riffel Alp, and in the Zmutt-Thal.—*E. cardamines*. Scarce at Kandersteg and Aigle.

Leucophasia sinapis. Kandersteg, plentiful; Loèche-les-Bains, Visp, very abundant; Riffel Alp, Randa, St. Niklaus, Aigle, Le Sepey, Chaumont, —Ab. *diniensis*. Aigle and Chaumont.

Colias palano. Staffel Alp and Riffel Alp. Apparently only just emerging.—*C. phicomone*. Kandersteg, Loèche-les-Bains, Zermatt; Zmutt-Thal, abundant; Riffel Alp, very abundant and exceedingly variable, some specimens being pale yellow; Randa, plentiful.—*C. hyale*. Kandersteg, Gemmi Pass, Loèche-les-Bains, Randa, Aigle, Le Sepey, Chaumont, nowhere abundant.—*C. edusa*. Spiezwyler, Mühlenen, Inden, Zermatt, Zmutt-Thal. Scarce everywhere.

Gonepteryx rhamni. Mühlenen, Aigle, Le Sepey, Chaumont. Only a few specimens seen, apparently only just emerging.

LYCÆNIDÆ (20 species).

Thecla ilicis. Inden, St. Niklaus, Aigle, Le Sepey, Chaumont; very abundant at the latter locality.—Var. *æsculi*. Chaumont.

Chrysophanus virgaureæ. Randa, St. Niklaus, not uncommon.—Var. *zermattensis*. St. Niklaus.—*C. hippothoë*. Kandersteg, a few specimens.—Var. *eurybia*. Zermatt, Zmutt-Thal, plentiful; Randa, very plentiful.—*C. gordius*. St. Niklaus, one specimen.

Lycæna ægon. Visp, plentiful; Zermatt, Zmutt-Thal, near Randa, very abundant.—*L. argus*. Near Randa.—*L. pheretes*. Loèche-les-Bains.—*L. orbitulas*. Gemmi Pass, Riffel Alp, Zmutt-Thal.—*L. astrarche*. Kandersteg.—*L. eros*. Kandersteg, Riffel Alp, Zmutt-Thal, Zermatt, Randa.—*L. icarus*. Nowhere plentiful.—*L. eumedon*. One specimen in the Zmutt-Thal.—*L. escheri*. Near Loèche-Ville and Randa; single specimens only.—*L. bellargus*. Kandersteg.—*L. corydon*, Randa, plentiful; Aigle, Le Sepey.—*L. hylas*. Kandersteg, not uncommon; Randa, Aigle, Le Sepey.—*L. damon*. Inden, Aigle, and Le Sepey, not uncommon; Chaumont, near Neuchâtel.—*L. minima*. Mühlenen, Kandersteg, Gemmi Pass, Loèche-les-Bains, Riffel Alp.—Ab. *alsoides*. Several specimens in different localities.—*L. semiargus*. Mühlenen, Kandersteg, Riffel Alp, Zmutt-Thal, St. Niklaus.—Var. *montana*. Kandersteg, Riffel Alp, exceedingly plentiful; St. Niklaus, Gemmi Pass, Zermatt, Zmutt-Thal, abundant.—*L. arion*. Kandersteg, Gemmi Pass, above Loèche-les-Bains, Inden; nowhere plentiful. Var. *obscura*. Riffel Alp, Kandersteg, Gemmi Pass, Loèche-les-Bains, Inden.

APATURIDÆ (1 species).

Apatura iris. Saw one specimen near Aigle, on the road to Le Sepey.

NYMPHALIDÆ (22 species).

Limenitis camilla. A few specimens near Emd in good condition and apparently just emerging.

Vanessa c-album. Saw one specimen near Serrières.—*V. polychloros*. Chaumont.—*V. urticæ*. Almost everywhere.—*V. atalanta*. One hybridized specimen only.

Melitæa cynthia. Riffel Alp.—*M. aurinia* var. *merope*. Riffel Alp and Gemmi Pass.—*M. phæbe*. Randa, not uncommon; St. Niklaus, Aigle, not uncommon.—Var. *minor*. Randa.—*M. didyma*. Aigle, exceedingly abundant and very variable; some specimens approaching var. *neera*; Le Sepey, Inden, Randa, St. Niklaus, Chaumont.—Var. *alpina*. Aigle and Le Sepey, not uncommon.—*M. dictynna*. Kandersteg, very plentiful; Mühlenen, Gemmi Pass, Inden, Randa, Aigle, Le Sepey. At Randa I took an hermaphroditic specimen, in which the right side, which represents the female, is larger than the opposite pair of wings, which is the male.—*M. athalia*. Kandersteg, Inden, Randa, abundant; St. Niklaus, Stalden, Aigle, not uncommon; Le Sepey, Chaumont. Very large specimens were obtained at Aigle.—*M. parthenia* var. *varia*. Riffel Alp, very plentiful; Randa, plentiful; at the latter locality they were intermediate between the variety and the type.

Argynnis euphrosyne. Kandersteg, Gemmi Pass, Loèche-les-Bains, Zmutt-Thal.—*A. pales*. Gemmi Pass, Loèche-les-Bains, Riffel Alp, exceedingly abundant; Zmutt-Thal and Staffel Alp, plentiful; Zermatt, Randa.—Var. *napæa*. Riffel Berg and Staffel Alp.—Var. *isis*. Riffel Alp, Zmutt-Thal, Gemmi Pass.—*A. dia*. Aigle.—*A. amathusia*. Kandersteg, plentiful; Zmutt-Thal, plentiful; Randa.—*A. daphne*. One specimen at Reichenbach.—*A. latonia*. Visp, Zmutt-Thal.—*A. aglaia*. Kandersteg, Zmutt-Thal, not uncommon; Randa, Aigle, Le Sepey.—*A. niobe*. Zermatt, Zmutt-Thal, plentiful; Randa, very plentiful; St. Niklaus.—Var. *eris*. Zmutt-Thal, very plentiful; Randa, very plentiful. Everywhere more numerous than the type.—*A. adippe*. St. Niklaus, Stalden, Aigle, Le Sepey, Chaumont.—*A. paphia*. Aigle, Le Sepey, St. Niklaus.—*Ab. valezina*. St. Niklaus.

SATYRIDÆ (26 species).

Melanargia galatea. Abundant everywhere in the valleys and lower mountain region.

Erebia melampus. Riffel Alp, very plentiful; Zmutt-Thal, plentiful.—*E. mnestra*. Gemmi Pass, Riffel Alp, plentiful.—*E. pharte*. Kandersteg, Gemmi Pass.—*E. ceto*. Gemmi Pass, Loèche-les-Bains, Randa, not uncommon; near Zermatt.—*E. medusa*. Kandersteg, very abundant.—*E. œme*, Kandersteg, abundant; Gemmi Pass.—*E. stygne*. Gemmi Pass, Loèche-les-Bains, pretty plentiful.—*E. glacialis*. Riffel Berg, Gorner Grät, Gemmi Pass above Loèche-les-Bains.—*E. gorge*. Riffel Alp and Riffel Berg, very plentiful.—*E. lappona*. Gemmi Pass, plentiful; Riffel Berg.—*E. ligea*. Kandersteg.—*E. euryale*. Kandersteg, Randa, near Emd. Apparently just emerging.

Satyrus hermione. Inden, St. Niklaus, Aigle, plentiful; Le Sepey, Chaumont.—*S. semele*. In several localities; very large on Chaumont, near Neuchâtel.—*S. cordula*. St. Niklaus, exceedingly numerous; Aigle, not uncommon; Le Sepey.

Pararge mœra. Not uncommon at Spiezwyler, Mühlenen, Reichenbach, Frutigen, Kandersteg, Loèche-les-Bains, Inden, Randa, St. Niklaus, Aigle, Le Sepey. The var. *adrasta* was obtained in several localities.—*P. hiera*. Two specimens on the Gemmi Pass above Kandersteg.—*P. megara*. Kandersteg.—*P. ageria* var. *egerides*. Kandersteg.—*P. achine*. One specimen between Aigle and Le Sepey.

Epinephèle janira. Exceedingly abundant everywhere in the lower mountain region.—*E. hyperanthes*. Abundant in most of the valleys of the lower mountain region.

Cænonympha pamphilus. Not seen in abundance anywhere.—*C. satyrion*. Kandersteg, very plentiful; Gemmi Pass, Loèche-les-Bains, Riffel Alp. At the latter locality I obtained specimens of var. *darwiniana*, which is intermediate between this and the following species.—*C. arcania*. Chaumont, near Neuchâtel.

HESPERIDÆ (13 species).

Spilothyrs alceæ. One specimen near Mühlenen.—*S. lavateræ*. A few specimens at Randa, St. Niklaus, Aigle, and Le Sepey.

Syrichthus carthami. Inden, St. Niklaus.—*S. fritillum*. Gemmi Pass.—*S. alveus*. Gemmi Pass, Riffel Alp, Riffel Berg, abundant; Zmutt-Thal, Randa.—*S. cacillæ*. Riffel Alp.—*S. sao*. Single specimens at Inden and Randa.

Nisoniades tages. Kandersteg.

Hesperia thauwas. Mühlenen, Kandersteg, Randa, abundant; Aigle, Le Sepey.—*H. lineola*. Zmutt-Thal, Randa, plentiful.—*H. sylvanus*. Not uncommon in many localities.—*H. comma*. Riffel Alp.

Carterocephalus palamon. Kandersteg and Inden.

Birmingham, Dec. 8th, 1895.

NOTE ON *DIADEMA MISIPPUS* IN TENERIFE.

By SIDNEY CROMPTON, F.E.S.

I HAVE to announce an extremely interesting capture in this island, i.e., of *Diadema misippus*, male.

It is well known to entomologists that the female *D. misippus* accompanies *Danaüs chrysippus* throughout its geographical range, with the exception, I believe, of the European shore of the Mediterranean. *D. misippus* has even followed *D. chrysippus* to outlying oceanic islands, both the butterflies being found at St. Helena, at Bourbon, and at Mauritius; but until now it has never been caught in Tenerife, or any other part of the Canarian archipelago, though *D. chrysippus* abounds in these islands.

The history of its appearance and capture here is as follows: About a month ago I had occasion to visit Puerto Orotava (the well-known fashionable health resort in this island) on business, and I stayed as usual at the Taoro Hotel. The hall porter (Mr. Booker, by name), knowing that I am an ardent entomologist, asked me if I had seen "the new butterfly," to which, of course, I replied "No." He then told me that he had seen a butterfly flying about the hotel garden, entirely different from any other butterfly he had ever seen here before—"very large, black, with white spots." Brother entomologists, imagine the state of excitement I was thrown into by this announcement,—I who had been diligently collecting Lepidoptera in these islands for four years, to hear of this addition to the fauna!

Mr. Booker had not only seen it, but had actually caught it one day while fluttering about the hotel steps; he had it under his

hat, but in trying to secure it with his hands it escaped. Not only had the hall porter at the hotel seen it, but a friend of mine, staying there, told me later that he also had seen a butterfly (described again as "black, with white spots") flying about, quite distinct from any other butterfly he had noticed here. The English Chaplain, the Rev. Laurence Hamerton, had also seen this black and white visitor, and being an entomologist himself, had been out every day with his net to try and catch it. Mr. T. Reid, the son of the British Vice-Consul, had also seen it. So the fact seemed established, without doubt, that some new butterfly had really come to this island.

I had to leave Orotava next day to return to Santa Cruz, with rage in my heart at the stupid business which imperatively summoned me away from the scene of the new butterfly's mysterious flutterings. I had not then had the pleasure of making Mr. Hamerton's acquaintance, but my feelings towards him as I drove back to Santa Cruz were not charitable and not Christian. Why, I said to myself, should he be assiduously pursuing this prize, while I was unable to give chase as well?

I was prevented going over to Orotava again till about a week ago. Imagine my feelings when the hall porter at the hotel greeted me with the information that Mr. Hamerton had caught two specimens of the butterfly. I rushed off to the parsonage and sent in my card. Mr. Hamerton at once came out, and courteously and willingly showed me the two butterflies—two fine male *Diadema misippus*. One he told me he had caught flying in company with *D. chrysippus*.

I was again summoned back suddenly and unexpectedly to Santa Cruz, without myself having seen a specimen of *D. misippus*. However, the day after I returned, when I came back to Salamanca (the house in which I am at present stopping), I was greeted by my sister-in-law, Miss Douglas, with "What do you think? I've caught the Orotava butterfly!" And this noble girl (does not she deserve a medal from the London Entomological Society?) produced a case in which was a lively and beautiful male *D. misippus*. I did not (like Mr. Bultitude, when Dr. Grimstone told him he was to be expelled) indulge in "indecent rapture," but I felt, as Keats says—

"Like some watcher of the night
When a new planet swims into his ken."

And this is the true history of the first appearance in these islands of *D. misippus*. So far three specimens have been caught, all males. The female, having such a close resemblance to the *D. chrysippus*, now so abundant here, would naturally escape notice. That they will be caught later hardly admits of a doubt.

I should be inclined to think that these *D. misippus* did not reach here by flight from the nearest land where they are found—

the African coast, as both Mr. Hamerton's two specimen and mine are very fresh-looking and unrubbed, as if newly emerged from the pupa. Perhaps the larvæ were carried here by some steamer, or perhaps the pupæ.

Readers interested in this subject of the mimicry of *D. chrysippus* by the female *misippus*, are referred to Mr. Roland Trimen's paper, 'On some Mimetic Analogies among African Butterflies,' published in the 'Transactions of the Linnean Society,' vol. xxvi. Part the Third. 1869. Also to his 'South African Butterflies,' vol. i., pp. 279-280.

Salamanca, Santa Cruz de Tenerife,
Nov. 26th, 1895.

SAWFLY LARVÆ IN 1895.

By E. F. CHAWNER.

As far as the Lyndhurst district of the New Forest is concerned, 1895 has been a year of surprises. The spring season was very bad, many common flies being altogether absent. I only saw one *Tenthredo viridis* (a female), though I searched carefully, wishing to obtain specimens for the purpose of breeding from them. *Tenthredo livida* was quite a rarity, and I did not see a single *Tenthredopsis microcephala* where the year before they had simply swarmed. Even the ubiquitous *Allantus arcuatus* and *Dolerus gonagra* were scarce. Just a few species appeared in their usual numbers, the most noticeable being *Nematus pavidus*, *Cræsus septentrionalis* and *C. latipes*, and the larvæ of *Emphytus serotinus*. Such scarcity of flies naturally pointed to a bad larval season, at least so I supposed, but on the whole have been agreeably mistaken. The change began at the end of August with the discovery of several large hatches of *Nematus tibialis* on some young acacias growing in one of the enclosures. Where they can have come from is a mystery, for I have frequently searched those acacias, and until this season have never found any larvæ on them.

On August 29th I went to Stafford, and there reaped a really good harvest off alder and poplar, birch being most unprofitable this year, and sallow little better. From a plantation of young poplars I took a fair number of the curious larvæ of *Nematus compressicornis*, generally feeding two or three on a leaf, each individual surrounded by its remarkable "palisade," which prevents any possibility of mistaking the species. Besides these I found two unknown species, which I hope to be able to verify as flies next year. But the alders were by far the most productive. In one small thicket larvæ of *Camponiscus luridiventris* simply swarmed, hardly a leaf being without one or more of the curious flat creatures. A few full-fed *Cræsus varus*, remnants of a large

hatch, judging by the appearance of the bush on which they had been feeding, several *Eriocampa ovata*, many broods of *Hemichroa rufa*, ranging from freshly-hatched to nearly full-fed specimens, and three unknown species (probably *Nematus*) represented a profitable day's work. Another treasure trove was a black larva on ash, a strictly nocturnal feeder, burrowing just under the surface of the earth by day.

The following week, on my return to Lyndhurst, I was agreeably surprised to find a good hatch of *Cræsus varus*, and another of *Hemichroa rufa*, both of which I had vainly sought for four years. It is very strange how one may go over the same piece of ground year after year, and yet find new species.

Altogether the autumn season has quite made up for the disappointments of spring. The result of both together, as regards new species taken in or near Lyndhurst, may be summarised as follows:—April to August: *Cladius padi*. August to October: *Cræsus varus*, *Hemichroa rufa*, *Nematus tibialis*, *Pæcilosoma luteolum*; also four unknown kinds.

In or near Stafford, last week of August and first of September: *Nematus compressicornis* and *N. curtispina*, *Cladius rufipes* (one specimen), *Cræsus varus*, *Camponiscus luridiventris*, *Eriocampa ovata*, *Hemichroa rufa*, *Emphytus cinctus*, *Taxonus equiseti*, and four unknown kinds.

The following larvæ, usually common round Lyndhurst, were either entirely lacking, or much scarcer than usual: *Nematus abdominalis*, *N. ruficapillis*, *N. betulæ* and *N. lacteus*; *Eriocampa annulipes* and *E. varipes*, *Hylotoma gracilicornis*, *H. ustulata*, and *H. rosea*; *Pæcilosoma pulveratum*, *Dolerus næmatodis*, *Tenthredopsis microcephala*, and *Tenthredo viridis*.

As common as usual were the following larvæ: *Nematus pavidus*, *Cræsus septentrionalis*, and *C. latipes*, *Strongylogaster cingulatus*, and *Emphytus serotinus*. I may mention here that during five years in which I have endeavoured to rear the last named larva, I have been unsuccessful in every instance. I have tried young and full-fed larvæ, have given abundance of growing food, and earth in which to pupate. The result has always been the same. They are apparently healthy, feed well, go down with alacrity, and never come up again. I have tried keeping the earth moist and dry; have given it them shallow and deep. Nothing is of any use. I should be very glad to hear if these larvæ are commonly considered delicate, and what is the best treatment for them.

Lyndhurst.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

BY W. F. DE VISMES KANE, M.A., M.R.I.A., F.E.S.

(Continued from p. 331.)

DIANTHÆCIA NANA, Rott. — Widely spread and numerous in some localities where *Lychnis flos-cuculi*, or other food-plant, is abundant. Mr. Tutt, from want of published records, is mistaken in stating that it has been seldom taken in Ireland (Brit. Noct. vol. iii. p. 36). The Irish specimens have a very dark blackish ground colour, as noted by Mr. Birchall of the specimen sent him by Mrs. Battersby, from Cromlyn, Co. Westmeath. Mr. Tutt notices this under var. *suffusa* (*loc. cit.*), erroneously I think. Miss Reynell has also met with the same form in abundance at Killynon, in the same county, and they do not differ from a large series I took at Favour Royal, Tyrone, and elsewhere. They exactly correspond with a Scandinavian, and only differ from an Auvergne specimen in my collection, in the white patches of the latter being reduced in size. In connection with this it may be interesting to note that Berce (*Faune Ent. Française*) describes the ground colour as "bluish black," and the white patches conforming in size, &c., to the normal type. We see, therefore, that the reduction of the white traits is not dependent upon a northern latitude, nor the dark colour. The browner tint of British examples would seem to be rather a deviation from the commonest continental form. The var. *suffusa*, Tutt, occurs at Ballycastle, Co. Antrim, and on the same coast, a little further west, at Magilligan (*Curz.*), and Sligo (Brit. Noct.), but I have not seen this form. I took one specimen of (?) var. *intermedia*, Tutt, on the 15th May, at Rathlin I., off the Antrim coast, but it has the dentated ante-marginal line, and some markings on the base and inner margin in dingy whitish. I have seen no approach to the Shetland, Orkney, or Welsh forms with markings more or less obliterated, in Ireland, and consider that the character has probably been developed in the former islands by isolation and protective selection. It may be worth pointing out that some of these specimens show a superficial resemblance to *D. magnolii*, Bdv., where the orbicular remains distinct, and traces on the costa and elsewhere are faintly marked. This seems one of the instances in which a variety of one species approaches the facies of another. The moth flies long before dusk to the flowers of ragged robin, or species of *Dianthus*, &c., and is wary and shy of approach, though easily taken when settled. They can fly swiftly when not searching for flowers, and evidently rely rather on sense of smell than on sight, at least while daylight continues; as, when not flying up the wind, they dodge about the herbage as if quartering the ground, without apparently being attracted by

the colour of the flowers, and making for them directly. Sugar attracts this species as well as *D. cucubali*. Localities:—North coast of Derry and Antrim; Magilligan, Ballycastle, Portrush, abundant (*C.*), and Rathlin I.; Shores of L. Swilly, scarce (*C.*); Lagan Fields and Colin Glen, Belfast (*W.*), and Dunmurry (*Bw.*), plentiful; Co. Westmeath (*supra*); Enniskillen, not scarce (*S.*); Drumreask, Monaghan; Tyrone; Armagh, scarce (*J.*); Glandore, Co. Cork (*D.*); and Old Head of Kinsale; Dursey I. and the Blaskets, ordinary form, Co. Kerry; Knocknarea, Sligo (*Russ.*); Salthill, Co. Galway (*Curz.*).

[*DIANTHÆCIA COMPTA*, *Fb.*—There is no satisfactory evidence for the inclusion of this species in the Irish list. Mr. Bond was under the impression that Mr. Weaver took the specimen in his cabinet in Ireland, but probably it was otherwise. There are two genuine examples in the museum of Trinity College, Dublin, which formed part of Mr. Tardy's collection, who worked chiefly in the neighbourhood of Bray; but they are not labelled, and might have been sent him by friends, as it included many undoubted English insects not of his capture, and so was not exclusively Irish. Nevertheless Mr. Birchall, who wrote after Mr. Tardy's death, seems to have been convinced of their having been taken in Ireland by him, though he could not indicate the locality of their capture.]

DIANTHÆCIA CAPSINCOLA, *Hb.*—Generally distributed and common. Though admittedly a wholly distinct species, the purple colour of the imago, and a tinge of the same in the larva of *D. cucubali* seems the only distinction. The outer edge of the reniform stigma of the latter is usually, but not always, straighter I think, than that of the species under notice. In the female, however, the very extended ovipositor of *D. capsincola* is a remarkable trait.

DIANTHÆCIA CUCUBALI, *Fues.*—Found not uncommonly and very widely throughout Ireland, and frequents the sea-coast as well as inland localities, where it seems generally more numerous. At Farnham, near Cavan, I once saw a crowd assembled near a female apparently recently emerged. It comes to sugar sparingly. As noticed by Mr. Tutt in 'British Noctuæ,' the species is a very stable one; but I have taken a melanic specimen on the Blasket Islands which, while retaining all the pencilling on the blackish ground colour, has only the slightest trace of purple perceptible. It occurred in company with melanic variations of other species, due, in my opinion, to isolation acting in concurrence with a tendency to protective adaptation.

DIANTHÆCIA CAPSOPHILA, *Dup.*—Mr. Birchall writes:—"First captured by Mr. Barrett, in June, 1860 (see 'Zoologist,' p. 7324); occurs commonly on the Hill of Howth, but has not yet been

found elsewhere. The larva feeds on the unripe seeds of *Silene maritima*, from June to August; and the moth, though only single-brooded, is on the wing for the greater part of the same period. There has been much discussion as to the claims of this insect to be considered a species distinct from *D. carpophaga*, some of the darker varieties of which from Scotland approach *capsophila*, both in form and colour. The larvæ of *carpophaga* and *capsophila*, like the perfect insect, differ principally in colour, *capsophila* in both cases being the darker. The larvæ of *cap-sincola* and *conspersa* are, however, equally difficult to separate, and their slight variations in the larval state seem to be characteristic of the *Dianthœciæ*, and alone are insufficient to enable us to discriminate the species. Some may suppose that the common origin of the various species of the genus is indicated by these slight differences in the larval state; but for the purpose of classification *carpophaga* and *capsophila* seem to me to be abundantly distinct, and must be so recorded." To the above I would add, that I have taken this moth on Rathlin I., off our northern coast, so early as May 15th, and sometimes elsewhere as late as September. This habit seems conformable to that of the food-plant, which, according to its exposure, blooms from May to September. The larvæ of the later broods also hybernate, and I have dug them out of the sand-hills on April 10th, apparently almost full-fed. Probably therefore the moth is often double-brooded. Mr. Porritt took larvæ in June of all stages of growth, and many of these produced imagines in August following. The larvæ not only feed on the capsules and flowers, but when neither of these are available, on the leaves of the *Silene*. I have no proof that they ever resort to the roots. When more than half-fed, they bury themselves in the sand, or loose débris under the plant by day, and feed only at night. Since the publication of Birchall's 'Catalogue of the Lepidoptera of Ireland' in 1866, I have taken this species in twelve of our littoral counties; Mayo and Sligo being the exceptions, doubtless owing to my not having worked those coasts; and have bred great numbers from the larval stage. I have had but few larvæ of *carpophaga* to compare with them, but, from these and Buckler's figure of full-fed specimens, have come to the conclusion that in the last stage those of *D. capsophila* differ from the former in losing the dark subdorsal and side stripes. They then become an almost unicolorous dirty yellow, with only very faint traces of stripes, but with the dorsal circulatory canal distinctly perceptible. The young larvæ also are not uniform in appearance, the stripes varying greatly in their intensity in different examples. Out of all the imagines I have bred from the Irish coast, I never saw a single one which approached *D. carpophaga* in colour sufficiently to raise an honest doubt. But I have taken faded brownish specimens more than once, which were very near to the Pembroke

examples bred by Mr. Blandford, kindly shown me by Mr. Barrett. Mr. Russ sent me one from Sligo which was an undoubted *D. capsophila*, but bleached to a brownish hue. The Irish examples therefore of this species are very distinct, and though variable, from a cold grey ground (which I have taken in August, but never bred an example), and black somewhat shot with violet, to dull black with only vestiges of the stigmata and ante-marginal line observable. These latter (a very melanic form) came from the Blasket Islands (see *ante*, *D. cucubali*). The lines and markings, except when obliterated, are always whitish grey, without the ochreous tone observable in *carpophaga*. On the Continent some examples have a slightly warmer ground colour, with white pencillings, of which I possess two. There is but a shade of difference between them and the majority of Irish ones. Berce describes those from Doubs and Digne, in the Basses-Alpes, as blackish grey, often slightly tinted with a yellowish brown, with white lines and markings. The dark form tallies with Guenée's var. *A* (*suffusa*, Tutt), and to this almost all our Irish examples are referable. Occasional trivial aberrations occur, with whitish median and submedian nervures. The Manx and Irish *capsophila* are identical. It is noticeable, in connection with the specific controversy, that in France *D. carpophaga* is more or less abundantly found throughout the low-lying provinces; but *D. capsophila* is always pretty rare, and only occurs in mountainous districts. The same appears to obtain elsewhere in Europe, unless indeed it is found in Sardinia and Corsica on the coast, and not on the mountains. If then a variety of *carpophaga*, it must be recognised as a mountain form; and we have numerous cases, especially in botanical distribution, in which mountain and sea-coast produce a parallel fauna. So far the evidence in favour of merging the two species seems essentially weak. Localities (I follow the coast-line, and omit counties, for brevity):—Howth, Ireland's Eye, Lambay I., Killiney, Bray Head, Kilcool, Wicklow Head, Rosslare, the Saltee and Keragh Is., Dunmore, Tramore, Mine Head, Ballycottin, Roches Point, Old Head of Kinsale, Galley Head, Glandore, dark forms (*D.*); Castlehaven, Crookhaven, shores of Bantry Bay, Dursey I., Dingle Bay, the Blaskets (melanic form); Liscannor, Inishmor I., Ballyvaughan, Salthill, (*Curz.*); Inishboffin I., Renvyle and Crump I., Killary Bay, Lissadel, Knocknarea (*Russ.*); Mount Charles, and near Belle Isle; Sheephaven, Shores of L. Swilly, Inishowen Head, Ballycastle (*Curz.*); Rathlin I., Copeland I., Clogher Head.

(To be continued.)

ON A NEW VARIETY OF *PROAGODERUS RITSEMÆ*, LANSB.
(ONTHOPHAGIDÆ).

BY JOHN W. SHIPP.

PROAGODERUS, Lansb. (Notes, Leyden Museum, 1883, v. p. 14).

Ritsemæ, Lansb. *l. c.*, p. 14.

Var. *duvivieri*, Shipp = *ritsemæ* var. Duvivier, Ann. Ent. Belg. vol. xxxviii.

Var. *duvivieri*, Shipp.—Head of a slightly golden green colour; thorax dark green, more or less golden on the convex portion; elytra black, slightly tinted with an indigo blue; legs and feet dark green. The tubercles of the head are more pronounced than in the type. Spines of anterior tibiæ rather more strongly curved. Pygidium rather more strongly punctured than in the type.

There appears to be no specific distinction otherwise than as stated above, but it is distinct enough to be regarded as a variety. Mons. Duvivier obtained his examples from Ibembo, while my specimen, which agrees with the description of Mons. Duvivier's insect, was obtained from near Stanley Falls.

Oxford.

NOTES AND OBSERVATIONS.

A PROPOSED NEW WORK.—Messrs. H. Foster Newey and W. A. Rollason inform us that they are engaged in the preparation of a work on the larvæ and pupæ of British Butterflies and Moths, with careful and concise descriptions and outline illustrations of all the species, as far as possible, to form in general arrangement a companion volume to Newman's "British Butterflies and Moths." To ensure the early completion of the proposed work, they would be glad to have the assistance of entomologists in procuring the larvæ and pupæ of such species as they themselves are unable to obtain. A list of their desiderata will be found in our exchange pages. We may add that we have seen some proofs of their drawings and consider them excellent.

TENACITY OF LIFE IN INSECTS.—Dr. Knaggs's interesting notes on this subject (Entom. xxviii. 228) recall to my mind a case which I think is worth recording. A few seasons ago I caught a fine specimen of *Dorcus parallelipipedus*, which I placed in my cyanide bottle, and after leaving it there for some considerable time I took it out and set it. I let it remain on the setting board for a fortnight, at the end of which time I looked at it to see if it was quite dry and ready for removal. It appeared to be exactly as I had set it, not a leg had shifted; but as I did not require the board for immediate use, I thought I would leave it for another week to ensure its being thoroughly dry. When I went to remove it I was surprised to find that it had released

itself from the surrounding pins, and was slowly revolving on the pin with which it was transfixed, its legs beating the air. I think it somewhat extraordinary that this insect should have revived after a full fortnight's stupor.—EDWARD RANSOM; Sudbury, Suffolk, Dec. 1895.

ALPINE VARIETY OF *HESPERIA COMMA*.—In September, 1894, I collected a small series of this butterfly on the Wengern-Scheideck Pass, in the Bernese Alps, at the height of about 6000 ft. above the sea level in the lower Alpine zone or region of conifers. All the specimens differ from the type in being a little larger and possessing a melanochroic tendency, the dark markings being more intense, and occupying more space at the expense of the orange-coloured blotches and spots. As this appears to be a well-marked climatic variety, and not apparently having had any name attached to it, I beg to propose that it be called the var. *alpina*. It is quite distinct from the var. *catena*, which occurs at a greater elevation in the Pennine Alps, and also in Lapland.—W. HARCOURT-BATH; Birmingham, Dec. 8th, 1895.

NOTE ON *BOMBYX TRIFOLI*.—In Mr. D. P. Turner's note (Entom. xxviii. 277) he speaks of the hybernation of the larva of *Bombyx trifolii*. My experience is that the larva does not hibernate at all. I have had ova the larvæ from which hatched out in the spring, but I have never found larvæ in autumn. As to food, the larvæ will eat many things in captivity, and I have reared them successfully on hawthorn, but the main thing is providing proper ventilation and light; and without these they are generally failures whatever food they eat.—GEO. A. HARKER; Grand Bassam, W. Africa, Nov. 6th, 1895.

ENTOMOLOGICAL CLUB.—A meeting was held on November 25th last at Wellfield, 4, Lingard Road, Lewisham, the residence of Mr. Robert Adkin, who occupied the chair. Several interesting species of insects were exhibited. The question of the Club's collection was again brought forward, but postponed to the next meeting for settlement. Two members and some fourteen visitors were present.

CAPTURES AND FIELD REPORTS.

XYLINA ZINCKENII IN SUFFOLK.—On Sept. 30th I took a very perfect specimen of *X. zinckenii* at Copdock. It came to sugar at 6.45 p.m. The wind was east, and the moon very bright, only three days from the full.—JOHN H. HOCKING; Copdock Rectory, Ipswich, Nov. 23rd, 1895.

XANTHIA OCELLARIS IN BRITAIN.—The Rev. John H. Hocking captured a specimen of *X. ocellaris* at sugar in his grounds at Copdock, Suffolk, on Sept. 7th, 1895, and another example came to light on the 17th of the same month and was secured. Three specimens of this insect were taken in 1893 and one in 1894 (Entom. xxviii. 133); it seems probable therefore that *X. ocellaris*, like *Plusia moneta*, has come to stay. The species is widely distributed throughout Central Europe, but is nowhere so common as *X. gilvago*. The larva is said to feed on the buds of poplar. It would be exceedingly interesting if the claim of the species to a place in the

British list could be strengthened by the discovery here of its larva.—
RICHARD SOUTH.

A SUCCESSFUL MOTH-TRAP—Some particulars respecting the working of a moth-trap which I have used during the greater part of the last season may possibly interest some of your readers. I started the trap for the first time in June, and in every way it has been a distinct success. It is after the pattern of that very successful one belonging to Major Robertson, and though it might be placed in a better position, still it has performed its duty, often in an exciting and nearly always in a profitable manner. A strong light and a good reflector are of course the two essential requisites; if the light happens in any way to become extinguished during the night many, if not most, of the inhabitants of the trap will escape, which is a drawback I am seeking to overcome. Facing a small shrubbery and a grass-field with distant hedges, it has attracted the following insects:—

June.—*Smerinthus populi*, *Nola cucullatella* (not scarce), *Euchelia jacobææ*, *Spilosoma lubricipeda*, *S. menthastri* (both plentiful), *Odonestis potatoria* (male and female), *Leucania conigera* (this insect I have not taken by any other method), *Lithargyria* (swarms), *L. comma*, *L. impura*, *L. pallens*, *Xylophasia monoglyphæ*, *X. sublustris* (only for about a week), *Miana arcuosa*, *Grammesia trigrammica*, *Caradrina taraxaci*, *Agrotis exclamationis*, *A. corticea*, *Noctua augur* (swarms), *N. triangulum* (this I have not taken before), *N. brunnea*, *N. festiva* and var. *conflua*, *Apamea basilinea*, *Habrostola tripartita*, *H. triplasia*, *Plusia chrysitis* (the metallic colours being present when the first appeared), *P. iota* (some fine forms), *Hyphenæa proboscidalis*, *Uropteryx sambucaria*, *Rumia luteolata*, *Metrocampa margaritaria*, *Pericallia syringaria*, *Selenia bilunaria*, *S. lunaria* (1), *Hemithea strigata*, *Acidalia aversata*, *A. emarginata*, *Timandra amataria*, *Melanthia ocellata*, *Melanippe fluctuata*, *Anticlea rubidata*, *Eupithecia rectangulata*, *Phibalapteryx tersata*, *P. vitalbata*, *Cidaria miata*, *Eubolia bipunctaria*, *Cidaria fulvata*, *C. dotata*, *C. pyraliata*.

July.—*Arctia caia* (one with orange hind wings), *Bombyx neustria* (males only), *Pterostoma palpina*, *Lithosia complanula*, *L. griseola*, *Porthesia chrysorrhæa*, *Cilix glaucata*, *Charæas graminis*, *Leucania conigera*, *Xylophasia sublustris*, *X. rurea*, *Noctua triangulum*, *Amphipyra tragopogonis*, *Plusia iota* (getting worn), *Crocallis elinguaris*, *Pericallia syringaria*, *Boarmia repandata*, *Geometra vernaria*, *Epione apicaria* (2), *Acidalia imitaria*, *Ligdia adustata*, *Coremia ferrugata*, *C. unidentaria*, and many others mentioned under last month.

August.—*Pterostoma palpina*, *Bryophila perla*, *Luperina testacea* (swarms), *L. cespitis* (rather scarce), *Noctua rubi*, *N. umbrosa* (scarce), *N. xanthographa*, *Habrostola tripartita* (worn), *Neuronia popularis* (swarms of males, only one female), *Epione apicaria* (worn), *Cabera pusaria*, *Timandra amataria*, *Triphosa dubitata*.

September.—*Gortyna ochracea*, *Neuronia popularis* (one female only), *Tapinostola fulva*, *Anchocelis pistacina* (very variable), *A. lunosa* (some very fine specimens), *Xanthia gilvago* (a few), *Epunda lutulenta* (scarce), *Eugonia quercinaria*, *Eubolia cervinata*.

October.—*Himera pennaria* (males only), *Cheimatobia brunata* (very early?).

November.—*Asteroscopus sphinx* (not so scarce this year, but as usual only males), *Pæcilocampa populi* (one female, several males), *Diloba ceruleocephala*, *Cerastis spadicea*, *Himera pennaria*, *Hybernina aurantiaria*, *Cheimatobia brumata*, *C. boreata* (2).

Close, rainy nights I have found to be the most favoured; after one such I counted nearly 500 prisoners of various kinds. The trap stands facing due north, which with our prevailing S.W. winds is an advantage, as I have continually found that insects fly against the wind rather than with it, especially Noctuæ.—C. J. NASH; Standish Vicarage, Stonehouse, Gloucestershire.

NOTES ON SUGAR IN THE COTSWOLD DISTRICT.—Seeing Mr. Fitzgerald's interesting account of the insects he has taken at sugar, and being distant only about ten miles from his district, Dursley, I mention below some of the Lepidoptera that I have turned up here at sugar in the last season. Although ten miles is a comparatively small distance, still it is enough to make some difference in the species that occur. The mixture I use is beer, foots-sugar, and essence of almonds; the latter I find very attractive. During all May and part of June I was absent from home, but from the middle of June to the end of August I sugared some fifty trees with the following result, which, though fair, might have been better:—*Leucania comma*, *L. pallens*, *L. impura*, *Xylophasia sublustis*, *X. polyodon*, *X. lithoxylea*, *X. hepatica*, *Cerigo matura* (only one; last year plentiful), *Grammesia trigrammica* var. *bilinea*, *Thyatira batis* (a single specimen), *Leucania lithargyria* (in numbers), *Hydræcia nictitans*, *Agrotis exclamationis* (a pest), *A. segetum*, *Noctua augur*, *N. plecta*, *N. festiva* and var. *conflua*, *N. rubi*, *N. umbrosa*, *Amphipyra tragopogonis*, *Mania typica*, *M. maura* (very scarce), *Mamestra brassicæ*, *Apamea basilinea* (one), *A. didyma* (a pest, in great variety), *Euplexia lucipara* (scarce). In addition to the results at sugar, the following may be of interest:—*Chærocampa porcellus* (not scarce), *Plusia iota*, *P. v-aureum*, *Aplecta advena*, at the flowers of the honeysuckle. At the raspberry blossoms, which were more than usually attractive, these were the chief insects netted:—*Leucania impura*, *L. pallens*, *Habrostola tripartita*, *H. triplasia*, *Plusia iota*, *P. gamma*, *P. chrysitis*. In the woods and high ground near here the following species made their appearance:—*Argynnis aglaia*, *A. adippe* (scarce), *A. paphia* (very abundant, some actually flying about in cop.), *Vanessa c-album*, *V. atalanta*, *V. cardui*, *Melanargia galatea*, *Thecla w-album* (one), *T. rubi*, *Lycæna icarus*, *L. agestis*, *Hesperia thaumas* (this, with *M. galatea*, was especially abundant on one day only), *Macroglossa stellatarum*, *Euchelia jacobæ* (larvæ most abundant), *Nemeophila plantaginis* (scarce), (*Aplecta nebulosa* (on tree-trunks), larvæ of *Cucullia verbasci*, *Toxocampa pastinum* (flying in the long grass at dusk, and attracted by light), *Metrocampa margaritaria*, *Zonosoma linearia*, *Asthena blomeri*, *Tephrosia biundularia* (scarce, though usually plentiful), *Strenia clathrata*, *Minoa murinata*, *Melanippe procellata* (one), *Eubolia bipunctaria*, *Anaitis plagiata*. Larvæ have been rather scarce, the best find being one *Notodonta ziczac*; not having taken of these in the larval stage before, I was agreeably surprised. This completes my list, and it is one with which I am well satisfied.—C. G. NASH; Standish Vicarage, Stonehouse, Glos.

SPHINX CONVULVULI IN HAMPSHIRE.—Between Aug. 11th and Oct. 2nd sixteen specimens were taken by me at Christchurch.—A. DRUITT; Christ church, November, 1895.

SPHINX CONVULVULI IN ESSEX, 1895.—I took a fine example of this moth, hovering in front of honeysuckle in my garden at 10.30 p.m., on Sept. 3rd.—GERVASE F. MATHEW; Dovercourt, Essex, Nov. 19th, 1895.

COLIAS EDUSA IN SOMERSET, 1895.—I saw two males flying by the side of the road, while driving from Buckland Dinham to Bath, on Aug. 29th; they appeared to be bright and fresh.—GERVASE F. MATHEW; Dovercourt, Essex, Nov. 19th, 1895.

COLIAS EDUSA &C., IN JERSEY, 1895.—During a ten days' stay in Jersey, the end of last September, with a friend, we found *Colias edusa* simply swarming, so much so that I repeatedly took four in my net at once, with a fair sprinkling of var. *helice*. We also found *Pieris brassicæ*, *P. rapæ*, *Vanessa cardui*, *V. atalanta*, *V. urtica*, *Pararge egeria*, *P. megæra*, *Polyommatus phleas*, *Cænonympha pamphilus*, and *Lycæna alexis*, very plentiful, and distributed over the whole island; whilst *Satyrus semele*, *Epinephele tithonus*, *Lycæna argiolus*, *Macroglossa stellatarum*, and *M. fuciformis* were taken daily.—F. H. WAGSTAFF; Nov. 28th, 1895.

PYRAMEIS CARDUI, 1895.—I noticed a few worn specimens on the sea-bank and marshes in this neighbourhood during June and the beginning of July, and a few fresh ones in September, in clover-fields, while out shooting.—GERVASE F. MATHEW; Dovercourt, Essex, Nov. 19th, 1895.

GLOWWORMS IN OCTOBER.—On Oct. 15th last, in very warm wet weather, while driving along the Blackdown Hills between Taunton and Honiton, about six p.m., I observed several glowworms, *Lampyris noctiluca* (female), shining brightly among the herbage at the roadside. Altogether, perhaps, a dozen were seen. Is this not unusually late in the year?—S. G. REID; The Elms, Yalding, Kent, Nov. 20th, 1895.

LEUCANIA VITELLINA IN HAMPSHIRE.—I have to report the capture, at sugar, of two specimens of *Leucania vitellina* at Christchurch. One was taken on Oct. 3rd, and one on the 6th of that month. The specimens are in fair condition.—A. DRUITT; Christchurch, Hants, November, 1895.

RECENT LITERATURE.

Frail Children of the Air: Excursions into the World of Butterflies. By SAMUEL HUBBARD SCUDDER. 12mo. Pp. viii, 279. Boston: Houghton, Mifflin & Co. 1895.

THIS volume contains a selection of instructive essays, dealing with questions connected with the distribution, structure, history, &c., of butterflies, which were originally published in the same author's remarkable work on the 'Butterflies of the Eastern United States.' There are thirty-one of these papers, all written in an exceedingly pleasant style, and in each the subject under consideration is fully discussed. Several of the species referred to are British, and many of the others belong to genera occurring in this country.

We have great pleasure in calling the attention of our readers to this interesting little book.

Reports of Societies are unavoidably postponed until February.

EXCHANGE.

Marked * are bred.

Desiderata.—Myrtilli in exchange for numerous butterflies.—*C. B. Antram*; 54, *Elgin Road, Addiscombe, Croydon*.

Duplicates.—Galatæa, Adonis, and other scarce butterflies. *Desiderata*.—Pruni, Arion, &c., with full data.—*H. L. Wood*; *Old Grammar School House, Ashford, Kent*.

Duplicates.—Moneta* (a few). *Desiderata*.—Iris, Castanea, Cucullina, Fluctuosa, Strigosa, Albipuncta, Sparganii, Hyperborea, Oo, Luteago, Flammea, &c.—*G. F. Mathew*; *Dovercourt, Essex*.

Duplicates.—Many alpine Diurni, and a few Noctuæ and Geometræ. *Desiderata*.—All British Lycenæ, and many Noctuæ and Geometræ.—*E. Mory*; 112, *Austrasse, Basle, Switzerland*.

Duplicates.—Lucerneæ,* Similis* (Auriflua), Autumnaria* and ova. *Desiderata*.—Undulatus, Strigula, Senex, Albovenosa, Turca, Depuncta, Interjecta, Parthenias, Notha, Prunaria, Glabraria, Notata, Galiata, Sagittata, Dotata; pupæ of Strataria (Prodromaria).—*John Taylor*; 318, *Chadderton Road, Oldham*.

Duplicates.—Capsophila* (a few), Philanthiformis,* Zonaria,* Litura, Anachoreta,* Fuliginosa,* Lubricipeda,* M. Brassicæ,* P. Brassicæ,* Grossulariata,* a few of death's-head moth, Atropos, Atalanta,* V. Urticæ,* Rapæ.* *Desiderata*.—Many.—*J. Thorpe*; *Spring Gardens, Middleton*.

Duplicates.—Atalanta, Io, Ianira, Hyperanthus, Edusa, Urticæ, Euphrosyne, Pamphilus, Rubi, Phlœas, Icarus, Corydon, Alsus, Edusa, Rhamni, Napi, Cardamines, Rapæ, Malvæ, Tages, Sylvanus, Linea, Filipendulæ, Grossulariata, Defoliaria, Brumata, Dilutata, Rivata, Bucephala, Nictitans, Polyodon, Lithoxylea, Saucia, Trilinea, Pronuba, Satellitia, Croceago, Silago, Affinis, Meticulosa, Aprilina, Oxyacanthæ, Chrysitis, Gamma, Libatrix, Typica, Mi, Glypica, Plagiata, *Desiderata*.—Ova and pupæ of British butterflies and moths.—*W. Blackwell*; *Knockholt, Sevenoaks, Kent*.

Duplicates.—Exulans, Artaxerxes, Blandina, Solidaginis, Vetusta, Exoleta, Suspecta, Adusta, Macilenta, Rufina, Fuliginosa, Litura, Suffumata and var. Piceata, Cæsiata, Multistrigaria, Chi, and many others. *Desiderata*.—Aceris, Luctuosa, Pyramidea, Advena, Fuscula, Triplasia, Libatrix, Petrificata, Semibrunnea, and numerous common species to extend series.—*Arthur Horne*; 52, *Irvine Place, Aberdeen, N.B.*

Duplicates.—Lepidoptera: Edusa (males), Semele (males), Adonis, S. Populi, Caia, Monacha, Pudibunda, Menthastri, Vinula, Perla, Capsincola, Oxyacanthæ, Meticulosa, Libatrix, Plecta, Macilenta, Rufina, Ferruginea, Litura, Vaccinii, Spadicea, Satellitia, Illunaria, Aversata, Leucophæaria, Defoliaria, Dilutata, Centaureata, Unidentaria, Plagiata. Coleoptera: Leistus spinibarbis, Callidium violaceum, Bruchus rufinianus, Chrysomela lamina, C. hyperici, Oncomera femorata. *Desiderata*.—Very numerous.—*W. G. Butler*; *Hayling House, Reading*.

Duplicates.—Literana and vars., Hartiana and vars., Variegana and vars., Comptana, Perplexana, Comariana, Cinerana, Ophthalmicana, Rubiginosana, Pilleriana, Pinicolana, Buoliana, Pinivorana, Internana, Splendidulana, Palleana. *Desiderata*.—Cratægana, Prodromana, Lipsiana, Dimidiana, Portremana, Pauperana, Simplana, Latifasciana, Palifrontana, Abrasana, Pascuana, Sinuana, Penziana, Siculana, Siculana, Obtusana, Grandævana, Signatana, Nigricana, Scopariana, Pygmæana, Distinctana, Orobana, Ravulana, Erectana, Trauniana, Nimbana, Expallidana, Populana, Paludana, Tetragonana.—*Richard South*; 100, *Ritherdon Road, Upper Tooting, S.W.*

Desiderata.—Larva: Culiciformis, Myopæformis, Apiformis, Tipuliformis, Formicæ-formis, Rurea, Cynipiformis, Bembeciformis, Propugnata, Zonaria, Polyodon, Lupulinus, Hectus, Velleda, Æsculi, Ophiogramma, Impura, Arcuosa, Dahlii, Baia, Ianthina, Pudorina, Ashworthii, Obelisca, Graminis.—*W. A. Rollason*; 1, *Newhall St., Birmingham*.

CHANGE OF ADDRESS.—*H. L. Bonaparte-Wyse*, from Waterford, Ireland, to 18, Rue Dauphine, Paris, France.

MEETINGS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON. — ANNUAL MEETING, Wednesday, January 15th, at 8 p.m.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.—Meetings on the 2nd and 4th Thursdays in each month, at 8 p.m.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—The meetings of this Society (held at the London Institution, Finsbury Circus, E.C.) will take place on the 1st and 3rd Tuesdays in each month, from 7.30 to 10 p.m. as heretofore.

NORTH LONDON NATURAL HISTORY SOCIETY.—Meetings are held on the 2nd and 4th Thursdays in each month at the North East London Institute, Dalston Lane (close to Hackney Downs Station on the G.E.R.), from 7.45 to 9.30 or 10 p.m.

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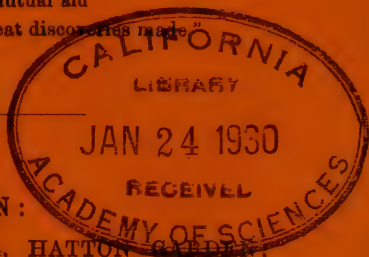
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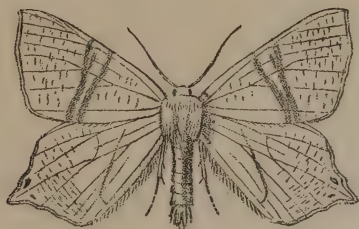
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FEBRUARY, 1896.

[No. 393.

UROPTERYX SAMBUCARIA AB.



THE above figure represents an aberrant specimen of *U. sambucaria*. It was received from Wolverhampton by Mr. Percy Bright, who has been good enough to allow Mr. Frohawk to take its portrait.

A very similar variety of this species was exhibited in 1881 at the London Entomological Society by Mr. C. O. Waterhouse, on behalf of Mr. F. H. Waterhouse, who took it at Wandsworth.

In addition to the foregoing, and apart from local forms, the only other aberration of *U. sambucaria* of which I have any knowledge is a remarkable specimen from Japan in Mr. Leech's collection. In this the ground colour is fuscous grey, or perhaps, more correctly speaking, dusky drab, and the transverse lines are very little darker; fringes, and spots at angle of secondaries are normal.

RICHARD SOUTH.

DESCRIPTIONS OF PREVIOUSLY UNDESCRIBED SPECIES OF DISMORPHINA IN THE NATURAL HISTORY MUSEUM.

By ARTHUR G. BUTLER, Ph. D.

Senior Assistant-Keeper of Zoology, British Museum.

ENANTIA ACUTIPENNIS, sp. n.

♂. Nearest to *E. aphrodite*, but the primaries with the outer margin much more oblique than in any of the species of the *E. licinia* group, giving the apex a more acute aspect; costal margin almost straight to beyond the discoidal cell. Wings above greenish white, slightly washed with sulphur-yellow towards the posterior angle of the primaries and on the external area of secondaries; base of costa of primaries yellow; apical border nearly black, internally trisinate; the first sinus from costa to subcostal vein, the second to lower radial, the third to end of first median branch; a semilunar subapical spot of the ground colour; secondaries with a short black marginal border at apex; primaries below chalky white, tinted in front with sea-green; costa sulphur-yellow, inclining to saffron-yellow at apex, where the apical area of the upper surface is indistinctly visible through the wing; base of costa also slightly tinted with saffron; secondaries sulphur-yellow, slightly washed with saffron at base and on outer border; two dust-grey stripes, the upper inarched and unequally bifid beyond the cell through the upper part of which it passes, the other discal, from submedian vein almost to first subcostal branch; pectus yellow, washed with saffron at the sides; venter white. Expanse of wings, 51 millim.

Trinidad (*J. H. Hart*). ♂. B. M.

In outline this species more nearly resembles one of the many named forms of *E. melita* than any of the *E. licinia* group.

DISMORPHIA NELLA, sp. n.

Allied to *D. siloe*. Male with a deep tawny streak from base to near end of cell, traversed at its commencement by the median vein; submarginal hyaline spots small and partly obliterated, otherwise as in *D. siloe*; secondaries with a tapering black streak from the border at end of third median branch almost to the abdominal margin; female with the basal half of primaries and the secondaries tawny, as in that sex of *D. theucharila*. Expanse of wings, ♂ 60 millim., ♀ 53-57 millim.

New Granada; Bogota. Colls. Hewitson and B. M.

In the Hewitson collection a female of this species is associated with *D. theucharila*, and two males and a second female with *D. siloe*; one male is in the Museum collection.

DISMORPHIA DISCREPANS, sp. n.

♂. Near to *D. amphione*, and apparently only differing from *D. beroe*, Lucas, in having the basal half of the costa of primaries ochreous, right up to the commencement of the yellow macular band;

in having the tawny area quadrid, a fourth division appearing above the base of the second median branch; and in the entire absence of the subapical series of yellow spots; the secondaries are slightly more prolonged at apex, and there is a large apical yellow patch on the under surface, larger than in *D. amphione*. Expanse of wings, 65 millim.

New Granada. ♂. B. M.

It is possible that this may prove to be a form of *D. beroe*, but the entire absence of the subapical yellow spots on the primaries gives it a very different aspect.

DISMORPHIA RHOMBOIDEA, sp. n.

♂. Allied to the preceding. Primaries with the basal three-fifths orange-tawny, excepting a costal trifid patch over the end of the cell, intersected by thick black veins; two longitudinal black streaks, one discoidal, unequally elongate diamond-shaped; the other fusiform, and connate with the submedian nerve-edging; a quadrate black spot on the upper discocellular veinlet; apical area black-brown; secondaries nearly as in *D. praxinoe*, but the tawny interno-median belt broader, and continued with a distinct curve to outer margin, merely edged on both sides with black; the anal rufous-brown border being also clearer and broader than in *D. praxinoe*. Under surface differing from that of *D. praxinoe* in the absence of the subapical series of yellow spots on the primaries, in the large subapical diffused yellow patch on the secondaries; the upper half of the discoidal cell black; a black streak on the costal vein terminating in a large oval spot; a large irregular black quadrate patch crossed by the discocellulars; a small black-brown spot just above the origin of the second median branch, and a larger cordiform spot close to it on the lower median interspace. Expanse of wings, 72 millim.

"Nauta" (Degand). ♂. B. M.

It is believed that the specimens received as from Nauta were actually collected in E. Peru. In the Hewitson collection there is a pair of what I take to be a variety of this species, but he has not labelled them with their habitat; they differ in having the yellow costal spots continued as an oblique band almost to outer margin, leaving an irregular broad black streak from outer margin to above the middle of the second median branch; the female has the hind wings tawny, with quadridentate black apical border and indistinct brownish testaceous anal borders. It is probable that these specimens were collected in Ecuador by Buckley, as most of the butterflies in the fine collection obtained from him by Hewitson were never labelled with even an apology for a locality. Other examples of species in this group, in the Hewitson collection, can only doubtfully be assigned to their proper species for the same reason.

LEPIDOPTEROUS LARVÆ IN WALNUTS.

BY F. V. THEOBALD, M.A., F.E.S.

Economic Entomologist to the S.E. Agricultural College.

SEEING Mr. Adkin's paper on *Carpocapsa pomonella* (*ante*, p. 2) as a nut-feeder (which is of interest economically), I thought that perhaps a few additional notes on larvæ in walnuts might not be out of place. For some years past I have been investigating the insect-pests of the walnut, and have found the larvæ of two moths present in the nuts, namely, *Carpocapsa splendana* and *Plodia interpunctella*. So far I have never come across *C. pomonella* myself in nuts, and am sorry to add this destructive Tortrix to the list of walnut insects.

C. splendana has been sometimes abundant in the nuts in this country, both in green as well as in ripe fruits. At first, on examining the larvæ, I came to the conclusion they were those of the apple or codlin moth (*C. pomonella*), but in all the samples of English walnuts I have examined they have turned out to be the nearly-allied species, *C. splendana*, which also feeds on the acorn and Spanish chestnut. The immature larvæ I have found in young fruit at the end of July and in August, on several occasions at Kingston-on-Thames, one tree losing quite 10 per cent. of the crop in 1892, owing to this pest. It was also plentiful at Great Staughton in August, 1894; and a few examples have occurred at Wye, Taplow, and other places in the green fruit.

In those that I have kept the larvæ lived in the nuts until full-grown, when they made their exit. This took place during September, and a few even in October. After a short time the maggots spun a pale silken cocoon at the sides of the "cages." Numbers were also found (just as we find *C. pomonella*) spun in the crevices of the walnut bark. I called attention to this species in my Report on Injurious Insects for 1894.

The second species, *Plodia interpunctella*, Hübn., or the "Indian meal moth," is also often abundant in walnuts. So far I have only had my attention drawn to it in reference to stored nuts. *P. interpunctella* is the "maggot" that we generally find, to our surprise, at dessert. Where the moth lays its eggs I do not know. According to Mr. Crittenden ('Year-book' of the U.S. Department of Agriculture, 1895), this larva attacks all manner of stored provisions—currants, roots, herbs, figs, nuts, and other commodities. These larvæ I find generally, like those of *C. pomonella* described by Mr. Adkin, and unlike those of *C. splendana*, pupate in the nuts, in a mass of silk. This Phycitid breeds somewhat rapidly in stores, five or six generations appearing in the year. The presence in walnuts of *C. pomonella* is not surprising, when we consider the other Carpo-

capsidæ, but nevertheless alarming: let us hope it is not going to be as serious a pest to the walnut as it is to the apple, and sometimes pear.

Wye Court, near Ashford, Jan. 3rd, 1896.

NEW EXPERIMENTS ON THE SEASONAL DIMORPHISM OF LEPIDOPTERA.

BY DR. AUGUST WEISMANN.

(Translated from the German by W. E. NICHOLSON, F.E.S.)

THE following treatise contains an exhaustive account of a series of experiments, which I have made with various butterflies during the last decade, in order to obtain an assured answer to the question, which was suggested rather than solved in my first pamphlet, 'Ueber den Saison-Dimorphismus der Schmetterlinge.' I was able then (1875) to prove, what Dorfmeister had already, indeed, shown was probable for *Vanessa levana*, that with various seasonally-dimorphic species the forms, which alternate under the influence of warmth or cold, can to some extent be even converted one into the other. I had also sought to form some conception of how the phyletic origin of such dimorphism in a species could be considered as the effect of alternating climatic influences, but this was only an experiment, which I was far from considering as the final settlement of the whole question. I therefore made use of time and opportunity, when available, in order to obtain, by new experiments, more precise answers to the questions, how far the phenomenon of seasonal dimorphism in general might be produced by the direct effect of temperature, and how far changes of climate might produce permanent, *i. e.* hereditary, effects on the colour of Lepidoptera. I believe that I have now advanced a step further, and I have already expressed my present and, as I hope, more correct and complete views on these questions in one of my last writings,* relying on some of these experiments.

Had this not happened, I should have delayed the detailed publication of the experiments for some years, as we have not yet reached the end of the researches; rather new questions arise on the basis just won, which can only be answered by further series of experiments. In the meantime I feel myself obliged to bring forward illustrations of the experiments which have already served for deductions. Nevertheless I cannot neglect working at these questions again in the future, and more completely revising the material.

* Weismann, 'Das Keimplasma, eine Theorie der Vererbung. Jena, 1892, p. 523, u. ff.

I am glad to say that I am no longer almost the only worker in this field. Acute entomologists and excellent experimenters like W. H. Edwards in America, Merrifield and Dixey in England, Standfuss and Brandes in Germany, and younger gifted men of power like E. Fischer, have devoted themselves to these questions; and so it is to be hoped, that a deeper insight may be obtained into these phenomena, and at the same time into some of the processes in the formation of a species, and that those points, which at present must remain in the stage of conjecture, at no remote time may be raised to ascertained fact.

In order to support my views, I have not hesitated to bring forward my interpretation of the facts as they are now presented to the experience of myself and others, at the risk of having to alter much of it later on, as we do not make progress by blind experiment, but only by experiment having a purpose in view; and for this we require an interpretation of the immediate facts.

If I have taken my own theory of heredity as a starting-point for theoretic considerations, this is not because I would force it upon the reader, but because at the present time it is the only theory, that has been so far worked out in detail, that it is possible with it to approach the explanation of the phenomena here in question. But a theory, that can be applied to isolated phenomena, has already achieved much, as by this means definite formulæ are obtained, which can be worked with, and which have their value even if in the future much of the theory should be proved to be erroneous, and should have to be altered. They can then be embodied in the new formulæ of the better theory without the progress, which they have brought, being necessarily lost.

Freiburg, April 30th, 1895.

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I. EXPERIMENTS AND OBSERVATIONS ON CHRYSOPHANUS PHLÆAS, L.

A. *Experiments with a Brood from Parents from the South of Europe.*

Dr. Schiemenz, of the Zoological Station at Naples, was good enough, in the spring of 1888, to capture some females of *phlæas* in the open in the neighbourhood of Camaldoli, and to obtain some eggs. Some of the eggs were reared by himself at Naples,

while others were sent to me at Freiburg, and formed the material for the following experiments.

I cannot neglect the opportunity of here tendering my warmest thanks to Dr. Schiemenz for his kind support of my efforts. Any one who knows from his own experience the difficulty and liability to accident in obtaining such material for research can estimate, how far these thanks are deserved. Even from German *phlœas* I endeavoured to obtain eggs in vain for years, and when I at length succeeded it was still only a moderate number.

(1) *Neapolitan Eggs reared at Naples*.—The eggs, which were laid at Naples in the beginning of May on *Rumex acetosella*, were reared on plants grown in pots, and produced 36 butterflies between June 26th and 29th. These are all characterized by a very broad deep black margin on the upper side of the fore wings, and by very large deep black spots. Many also exhibit the black powdering of the brilliant red-golden ground colour characteristic of the var. *eleus*; however, this latter character is very unstable, and very unequally developed. Three degrees may be separated according to the extent of the black powdering of the fore wings.

A. Darkest form. Only 3 to 5 small washed-out spots remain of the red-gold of the ground colour; all the rest of the surface of the wings is powdered with deep black, and only exhibits scattered red-golden scales, which produce a slight golden lustre. Only slight traces of red-golden spots can be recognized outside the band of black spots. Eight specimens of this form.

B. Intermediate form. The red-golden ground colour is visible outside the band of black spots in the form of definite spots, but all the lower half of the wing is strongly powdered with black. Twelve specimens of this form.

C. Brightest form. The lower half of the wing, from the base to the band of spots, is powdered with black, which does not extend outside the same. Twelve specimens of this form.

All three forms consequently merit the name of the var. *eleus*, although they vary greatly just in the characteristic of this variation "of the black powdering of the upper side of the fore wings." This cannot be regarded as the effect of rearing in a room, but as a peculiar variability of the summer brood of *phlœas* at Naples. A specimen of *phlœas* from Greece and one from Corsica are even blacker than the variety A, as they indeed no longer have any red-golden spots, but only a slight golden lustre, which results from scattered golden scales.

I possess 71 specimens of *phlœas* from Southern Japan (Tokio), which were captured in June and July, 1887, and consequently all belong to the summer brood. All have a very broad black margin and large deep-black spots, but the black powdering of the red-gold ground colour is with them also of very varying strength. Only 3 are equal in darkness to the specimens already noted from Greece and Corsica; in many only the basal portion

of the lower half of the wings is powdered with black, and 14 specimens are without any powdering, beautifully red-golden. Consequently here also great variability of the *eleus* characters prevails.

(2) *Neapolitan Eggs reared at Freiburg*.—By the kindness of Dr. Schiemenz, on May 19th, 1888, I received the first batch of eggs of *phloxas* from Naples, which were mostly laid on dry pieces of the leaf or stem of *Rumex acetosella*. These were gummed on to flowering plants of *Rumex acetosella*, where they developed quite satisfactorily in a room at a temperature from 20°–21° C., as did the eggs of several batches which succeeded one another up to May 24th. Some 70 larvæ emerged between May 22nd and 26th. These are not at first louse-shaped, but of the shape of ordinary larvæ, bright yellow in colour, and covered with a down of long hairs. They were already louse-shaped on June 4th, and of the green colour of the sorrel-leaves, some also with a bright vinous-red dorsal stripe and subspiracular stripes. They ate the chlorophyll-layer of the tender leaf from below, leaving only the epidermis. They are tardy and sluggish in their movements, and only leave a leaf, when it is entirely demolished. When they were almost full-fed (June 7th), they ate the whole leaves like other larvæ. Many remain entirely green, while others exhibit the bright vinous-red longitudinal stripes on a green ground, an adaptation of colour to the reddish stems of many plants of sorrel, the red of which is nearly of the same tint as that of the larvæ. Both forms of the larvæ thus possess excellent protective coloration.

I proved some years ago for *Vanessa prorsa-levana* that the black and yellow colouring of the larvæ, which occurs with this species, is no way connected with the variability of the butterfly. In order to preclude any such suggestion here, I reared the green and the red larvæ separately; and here also I found, *that the variations of the perfect insect are in no way related to the colouring of the larvæ*. Thirteen butterflies from the green and 22 from the red larvæ exhibited no constant differences.

From June 16th the larvæ fastened themselves up for pupation, which took place between June 21st and 28th. The whole of the larvæ were now before pupation divided into two lots, of which lot A was for the future kept in the temperature of an ordinary room, while lot B was placed in a lower temperature, in order to see what changes in the colour of the perfect insect could be thereby produced.

Lot A.—Pupæ in an ordinary room temperature. The temperature of the room from June 9th to 13th was 20° C. or a little more, and from June 14th to 22nd, 18° C. During this time 35 butterflies emerged. Of these 8 were decidedly var. *eleus*; the rest exhibited no black powdering of the red-gold, but all indeed had broader margins of a deeper black and larger black spots

than the German *phlæas*, and even than Sardinian *phlæas* of the spring brood.

Lot B. — These larvæ were at the commencement of their pupation placed in the cellar or the refrigerator. As pupation at the temperature of the latter, 6–10° C., did not generally take place, they had to be taken out again, and were brought into the temperature of the cellar, at little over 10° C. Under these circumstances pupation was delayed for a very long time, and lasted over a month (from June 22nd to July 25th). The pupæ then remained in the refrigerator at from 7–10° C., where several butterflies emerged between Aug. 27th and Sept. 16th. It was evident, however, that the dampness of the refrigerator not infrequently rendered the red quite pale yellow, so some of the pupæ still remaining were brought into a room, where 18 more butterflies emerged between Sept. 17th and Oct. 18th. The rest remained in the refrigerator, and by-and-by emerged at 10–11° C., most of them crippled, although very few to such an extent, that the colour could not have been recognized. In reference to brilliancy of colour, it was all one, whether the pupæ emerged in the refrigerator or in the room.

Of the 51 butterflies that emerged, only two are somewhat powdered with black, one of which emerged on Aug. 27th, and the other on Sept. 15th. All the others are bright red-gold, and have very small black spots; but the majority have a broad and deep black margin, and especially the black of the apex of the wing often spreads to the uppermost spot of the band of spots, while at the same time it extends as a broader stripe along the costa to the base of the wing. These are characters, which are not present in German specimens; it is such a mixture of characters of the southern and northern forms as is unknown to me in specimens captured at large.

The duration of a lower temperature for a very long time does not produce any increase of the effect, that can be recognized. To be sure the two darkest specimens emerged tolerably early, *viz.* on Aug. 27th and Sept. 15th, but perfectly bright specimens emerged on Aug. 31st, Sept. 5th, 6th, 7th, and 10th, and then again some rather darker specimens on Sept. 20th.

B. *Experiments with a Brood from German Parents.*

(3) *Eggs reared at an increased Temperature.* — A female captured at Leipzig in the middle of August, 1889, laid eggs, which were forwarded to me at Lindau, on the Lake of Constance, where I received them on Aug. 20th. As I did not know, whether the eggs of *phlæas* hibernated or not, I placed them at first in an unheated room having at that time a temperature of no more than 10° C. However, the first larva hatched on Aug. 27th. Thereupon I placed all the eggs in a hothouse, in which the

temperature fluctuated between 20° and 35° C., in such a way that from evening until 10 a.m. the temperature was 20–26° C., but about the middle of the day 25–35° C. All the young larvæ now hatched: 5 on Aug. 27th, 20 on the 28th, and 9 up to Aug. 31st.

On Sept. 12th I removed to Freiburg, and placed the 35 larvæ on growing plants of *Rumex acetosella* in a warmed incubator specially constructed for the purpose, which I call a brood-incubator. The temperature in the same was kept at 27–29° C., and care was taken for the humidity of the air by evaporating water. Pupation likewise took place in the incubator, and I obtained:—

On Sept. 15th, 1 pupa at 27° C.
 „ 19th, 6 pupæ at 27° C.
 „ 20th, 1 pupa at 29° C.
 „ 21st, 6 pupæ at 30° C.
 „ 22nd, 6 pupæ at 30° C.
 „ 23rd, 3 pupæ at 33° C.
 „ 24th, 2 pupæ at 30° C.

—
 Altogether 25 pupæ.

These pupæ produced 23 butterflies, viz.:—

On Sept. 19th, 1 butterfly at 27° C.
 „ 23rd, 1 butterfly at 33° C.
 „ 25th, 5 butterflies at 24° C.
 „ 26th, 3 butterflies at 29° C.
 „ 27th, 5 butterflies at 37° C.
 „ 28th, 4 butterflies at 37° C.
 „ 29th, 3 butterflies at 38° C.
 Oct. 5th, 1 crippled specimen.

—
 Altogether 23 butterflies.

The remaining pupæ did not emerge, and proved later on to be dried up. One of the butterflies of Sept. 26th escaped.

It will be noticed that the temperature in the incubator was gradually raised, namely, from 24° C. on Sept. 25th to 38° C. on Sept. 29th. The pupæ of Sicily and Greece are not often exposed to a higher temperature, as they pupate in shady places on and under stones, &c., where they are not often struck by the rays of the sun.

Of these 23 butterflies, at least 8 specimens closely resemble the ordinary German *phlæas*, so that consequently the raised temperature has made no effect upon them. Two specimens can be described as the var. *eleus*, as they are as strongly powdered with black, as many specimens of the darkest variety of the butterfly reared at Naples. Both specimens emerged on Sept.

27th, *i. e.* two days before the end of the period of emergence, and consequently were not subjected by a long way to the highest temperature ($37-38^{\circ}$ C.) immediately before their emergence, but only to a temperature of $23-29^{\circ}$ C.

Thirteen specimens are somewhat darker than the ordinary German form. They have the black margin a little broader, and the black spots somewhat larger. The black powdering of *eleus* is also present, although generally to a very slight extent, and principally on the lower half of the fore wing from the base towards the band of spots only. A sharp distinction cannot be drawn between these specimens and the 8 unaltered ones first mentioned, and it is doubtful, whether more than 8 specimens should not be reckoned in the first group.

C. Results of the Experiments.

The first question to be asked is: *Does the temperature to which the pupa is subjected affect the colour of the butterfly?* This can be unhesitatingly answered in the affirmative. The eggs of the Neapolitan butterflies more frequently produced butterflies powdered with black at Naples, than when they were reared at Freiburg in a room at the ordinary summer temperature, and they resulted in butterflies without any black powdering, when the pupæ were kept at $6-10^{\circ}$ C. On the other hand, eggs from North German females of *phlæas*, when their pupæ were subjected to $24-38^{\circ}$ C., resulted in some few specimens powdered with black, which were quite similar to the Neapolitan specimens of *eleus*.

It is proved by experiment 2, A and B, that the temperature only produces these changes during the pupal period, and that its operation during the larval period is without effect on the colour of the butterfly, inasmuch as the Neapolitan larvæ, which were all reared at the same room temperature and first treated differently during or after their pupation, produced such strikingly different coloration in lot A and lot B. On this account it was also unnecessary for the production of the summer form, to keep the eggs of the German butterflies at an increased temperature from the beginning of and throughout the whole larval period; it was, however, necessary, in order to bring the larvæ to pupation in the late autumn, which, considering the small number of insects available for the experiment, appeared very desirable. Had the larvæ been reared at a lower temperature, and the pupæ first brought into the incubator, the result would have been almost the same. In this respect the results of Merrifield, which will be mentioned later on, agree.

The second question is more difficult to answer. It is: *Has the effect of temperature on the colour of the butterfly become hereditary?* At the first glance this might be answered with a decisive "No," if it was taken into consideration that both in Sicily

(according to Zeller), as well as in Sardinia, the spring brood, even in captured specimens, is quite as pure red-gold as with us, while the summer brood is more or less dark. If we might assume that both forms of colour were adaptations, and possibly afforded protection to the insects, then it might be explained by the supposition of two kinds of determinants in the germ-plasm of the insects. But nothing can be adduced to support this; I at least cannot see what protection the darker colour of the summer form could in any way guarantee. This will not, indeed, say much for the slight insight which we have into the biological relations of the Lepidoptera; but first we shall be compelled to regard the blackening of *phlœas* by heat, as the direct effect of the latter, and not as the mere elimination of a second scheme of colour. But, if we do this, the pure fire-colour of the first brood in Sicily and Sardinia appears to prove, that the black powdering of the summer form has in no way impressed itself on the germ hereditarily.

I should, however, consider this a hasty conclusion. If we look at Experiment II. a little closer there can be no question, but that the brood of Neapolitan butterflies reared and kept as pupæ at Freiburg at an ordinary temperature generally produced much darker specimens, than the brood of German butterflies would have done under similar conditions, to be sure much more numerous dark specimens, than the brood of North German butterflies produced, when their pupæ were subjected to a high temperature for some time. Out of 23 butterflies only 2 were of the *eleus* form, *i. e.* about 8 per cent.; whilst out of the 35 butterflies of the Neapolitan brood, 8 possessed decided *eleus* colouring, *i. e.* 22 per cent.; and it must also be taken into consideration, that the latter passed their pupal existence at an ordinary room temperature, but the former at a higher temperature. There can be no other explanation, than that of the greater hereditary tendency towards black colouring of the Neapolitan brood, and the far slighter tendency thereto of the German brood.

As the direct darkening influence of heat is undeniable, so the idea is suggested, that the greater tendency of the Neapolitan brood towards blackness depends upon a permanent alteration of the germ-plasm by the heat working afresh each summer, the lesser tendency towards blackness of the German brood, on the lower summer temperature operating on numerous generations in the course of time. This is in no way a case of the inheritance of acquired characters, at least, there is no necessity, to so regard it. We need not imagine, that the black colouring of the wings produced by summer heat has been transferred from the wings through the body to the reproductive cells of the insects in question, an idea which can scarcely be thought of; but we may assume, that the heat affected at the same time the rudiments of

the wings (Flügelanlagen) in the pupa and the germ in its reproductive cells, and that in both elements were contained, which were altered thereby in a similar way.

It appears to me, that this case favours to no small extent the assumption made by me, according to which the germ contains preformed determining factors (Bestimmungsstücke) of the individual elements, which later on compose the body—"determinants." On this supposition the behaviour of *phlæas* is explained simply, as I have already shown elsewhere. These determinants, which determine the various scales of the wing, are found in the germ-plasm of the reproductive cells, and in the rudiments of the wings of the pupa; and it is easy to assume, that they are struck by the heat in both places, and influenced in a similar way, though not to an equal extent. We must conclude that the intensity of the modification is unequal, from the fact, that in all the known southern colonies of *eleus* the spring form is still red-gold. The effect on the scale-determinants in question of the germ-plasm must consequently be a very slow one, and the modification, which is induced by heat is not such a one, as leads under every condition to the formation of black scales, but only of such a kind, that the formation of black scales takes place more readily, and also, indeed, at a lesser heat. In this way it can be understood, that red-gold *phlæas* still, indeed, fly in the Neapolitan spring, but that although, at a lesser heat (the room temperature of the German summer), many specimens of *eleus* arise from pupæ of Neapolitan origin.

D. Comparison of the results obtained with those of Merrifield.

The excellent English entomologist, F. Merrifield,* has made a series of experiments with *Chrysophanus phlæas*, which I will recapitulate here. They are in a gratifying agreement with my own.

Females of *phlæas* captured in England laid eggs, from which 70 pupæ were reared. One portion of these were kept at from 27–30° C., and produced specimens with large black spots, and in most cases with a slight black powdering of the fore wings; the red band of the hind wings was narrow and strongly dentate. The other portion of the pupæ was placed on ice, *i. e.* kept for 10 weeks at 4° C., then for 5 weeks at 13° C. Half of the butterflies were crippled or died before emergence, but those which emerged were of a bright golden yellow colour, with small black spots and a broad red band on the hind wings, from which red lines are often continued even up the veins (just as with some of my iced Neapolitan specimens).

* F. Merrifield ("The Effects of Temperature in the Pupal Stage on the Colouring of *Pieris napi*, *Vanessa atalanta*, *Chrysophanus phlæas*, &c.") in Trans. Ent. Soc. Lond. 1893, p. 55.

If these results are compared with mine, there can be no doubt, but that the golden ground colour and the black are actually in direct dependence on the height of the temperature, which operates during the pupal period.

The last experiment of Merrifield's especially appeared very interesting to me, in which he first kept a portion of his pupæ for 10 weeks on ice, and then brought them into 30° C., when these pupæ produced, after 5-6 days, butterflies of the summer form, with black powdering and the narrow copper band of the hind wings. It follows from this that *the last days only of the pupal period* are decisive for these differences in colour, and that neither the larval nor the whole of the first pupal period comes into consideration. It could also be concluded from my second experiment, that the temperature of the larval period had no influence, as in this the larvæ were kept at the same temperature, and yet produced very different butterflies, according to whether the pupæ were subjected to cold or heat. But the fact, that the temperature first produces these differences in colour in the last 5-6 days of the pupal development, confirms the conclusion already drawn at the beginning, that it is not here a question of the suppression of one of two different schemes of development (Entwicklungsanlagen), but of a modification of the chemical processes in the colour formation of the scale. But if it is certain, that a high temperature produces darkening, and moderate cold a brightening, of the colour, still we have not yet exhausted the whole process in this; but it must be acknowledged that local races exist, which react more strongly or less strongly to the influence of cold or heat, and these local races correspond in their manner of reaction to the climate, in which they live, *i. e.* the races of warm climates are more readily accessible to the influence of heat, than those of cold climates. This appears to follow from my experiments, although, indeed, doubt might be raised, as each of the experiments was made only once; and it must be admitted, that it is impossible in experiments to entirely hit off the natural conditions of the insects, which develop in the open. The change of the day and night temperature also cannot be accurately produced, nor yet the degree of the humidity of the air in the open; it would consequently be conceivable, in the abstract, that, if everything was closely imitated, just as dark an *eleus* butterfly might arise from any German or even polar pupa of *phleas*, as from a Neapolitan one. The results of my experiment B contradict, however, this suspicion, as they show that the Neapolitan pupæ produced some well-blackened *eleus* at the ordinary room temperature in Germany, and many specimens, which are, indeed, red, but which are all provided with deeper black and larger black spots, than the German *phleas* exhibit as a rule. Also the Neapolitan pupa, kept on ice, produced, indeed, specimens which, in the small size of the black

spots, closely approached the Lapland specimens, but yet, on the other hand, exhibited a much darker black in the marginal band, and especially often a broad black costa, such as is present neither in these, nor in German specimens.

I have already shortly given my explanation of this variability of the hereditary predisposition in southern and northern colonies of *phleas*, and I have stated it more exhaustively in my book, 'Das Keimplasma, eine Vererbungstheorie.'*

(To be continued.)

ON THE SYNONYMY OF THE BRITISH BEE HAWK-MOTHS.

By W. F. KIRBY, F.L.S., F.E.S.

Assistant in Zool. Dept., British Museum (Nat. Hist.), S. Kensington.

THE synonymy of these species has always been somewhat uncertain; and I therefore, at Mr. South's request, give a short exposition of that adopted in my 'Catalogue of Lepidoptera-Heterocera,' vol. i.

In Linné's 'Systema Naturæ,' ed. x. (1758), four species are enumerated, which we have to consider:—

(1) *Sphinx porcellus*, p. 492, n. 16. There has never been any dispute about this insect.

(2) *S. tityus*, p. 493, n. 24. "S. abdomine barbato, cingulo nigro. M. L. V. Habitat in calidis regionibus. Alarum margo niger est." The letters "M. L. V." indicate that there were specimens in the collection of Queen Louisa Ulrica; but the species is not mentioned in Linné's subsequent work on this collection.

(3) *S. bombyliiformis*, p. 493, n. 27. "S. abdomine barbato coccineo, alis hyalinis luteo variis; posticis margine albis. Habitat in Europa."

(4) *S. fuciformis*, p. 493, n. 28. "S. abdomine barbato nigro; fascia flavescente, alis hyalinis margine nigro. Bradl. Nat. 26, f. 1, B. Roes. ins. app. 231, t. 38. Habitat in Europa."

Respecting *S. bombyliiformis* it is only necessary to say that in the 12th edition of Linné's 'Systema Naturæ' (1767) it is sunk as "*S. porcellus* β.," and it appears to have been only a rubbed specimen of that insect.

The difficult point relates to *S. fuciformis*, but the figures quoted all indubitably represent the *broad-bordered* bee hawk, as is proved by the dark mark at the end of the cell of the fore wings.

In the 'Fauna Suecica,' ed. 2, p. 289, Linné cites only Roesel, but adds to his former diagnosis: "Habitat in *Lonicera*"

* Jena, 1892, p. 523.

[*broad-bordered*]. "DESUR. Magnitudo Bombylii. *Corpus* griseum. *Abdomen* cingulo nigro; *barba* laterali pone cingulum albida. *Anus* *barba* nigra. *Antennæ* nigrae."

This complicates matters, for the character, "*Abdomen* cingulo nigro," applies better to the narrow-bordered (scabious) species than to the broad-bordered (honeysuckle) species, in which the belt is dark reddish rather than black.

In the 12th edition of the '*Systema Naturæ*' (1767), pp. 803, 804, Linné slightly modifies his description: "*S. abdomine* barbato nigro; *fascia* flavescente *alis fenestratis* *marginibus* nigro atro-purpurascente." He gives a long string of references, which we need not quote, and adds: "*β. Sphinx tityus* abdomine barbato cingulo nigro. *Syst. Nat.* 10, p. 493, n. 24. *Habitat* in *Lonicera*. *Barba* abdominis in medio alba est." We may disregard the last two sentences, for, according to Linné's method, they would be intended to apply to the species as a whole, and not specially to "*β.*"

Hence we may conclude: (1) the type of Linné's species was the broad-bordered species, feeding on *Lonicera*. (2) In his '*Fauna Suecica*' he mixed it up with specimens of his *S. tityus*, and added a character properly applicable to the latter. (3) In the 12th edition of the '*Systema*,' Linné, discovering that he had mixed two forms, separated the second as "*β.*" distinguishing it by the very character which, from those given, would at once separate his *Sphinx tityus* as the narrow-bordered bee hawk, feeding on scabious.

Hence, I take it, the name *bombylifomis* should disappear from our lists altogether, except as a synonym, primarily of *porcellus* and secondarily of the bee hawks, which should stand as *Hemaris fuciformis*, Linn. (broad), and *Hemaris tityus*, Linn. (narrow), respectively.

For the bee hawk-moths I prefer to use the generic name *Hemaris*, Dalman, Vet. Akad. Handl. 1816, p. 207, with the broad-bordered species as the type, regarding *Sesia* as more correctly applicable to the smaller clear-wings.

It is hardly worth while discussing the post-Linnean synonymy, as, even if *bombylifomis* was an allowable name for either species, it would become a mere synonym of one or the other.

THE NOMENCLATURE OF THE "BEE HAWK-MOTHS."

BY LOUIS B. PROUT, F.E.S.

TWICE within the last few months my attention has been called to the confusion which results from the fact that both the names *fuciformis* and *bombylifomis* have been by different authors applied to each of our species of "bee-hawk"; and I find that

the manner of employment of the names in our standard reference list ('The Entomologist Synonymic List') is not understood by all working entomologists. Unfortunately the change from the Doubleday nomenclature has not been noted in the published list of alterations. I therefore venture to submit the following summary for the assistance of readers of the 'Entomologist':—

Fuciformis, Linn. (*teste* Ochs.) = *fuciformis*. South's List = *bombyliformis*. Auct. Brit. = the "narrow-bordered," or scabious species.

Bombyliformis, Ochs. = *bombyliformis*. South's List = *fuciformis*. Auct. Brit. = the "broad-bordered," or honeysuckle species.

Zeller, in discussing this complication (Stett. Ent. Zeit., 1869, p. 387), suggested that the only solution of the difficulty would be to abandon the old names, and call the two species, for example, *scabiosæ* and *loniceræ*. But it appears to me that enough would be done, without doing violence to the recognized laws of nomenclature, if any one had the pluck to alter *one* of the names, thus:—

If *fuciformis*, L., be, as Zeller unhesitatingly affirms, the scabious species, that name stands, as in South's list.

But *bombyliformis*, Linn., is now universally rejected as doubtful. Therefore we have only to apply the very sensible rule, advocated by Mr. Kirby and other leading synonymists, that a rejected name is not again available in the same genus, and to rename the honeysuckle species, instead of calling it "*bombyliformis*, Ochs." And there could be no confusion between the two species "*fuciformis*" and "*loniceræ*," however unfamiliar the application of the former name to the scabious species might appear.

That we are dealing with a really practical question, and not only with one of intricate synonymy, was brought home to me by the two facts to which I referred at the commencement of this note. As a faunistic note, Mr. Rhoades Smith's record of *fuciformis* for Middlesex (Entom. xxviii. 233) is rendered unintelligible by the said confusion. I have it, on the authority of Mr. Percy Smith, that the insect in question was the *narrow-border*, its captor basing his nomenclature on Kirby's 'European Butterflies and Moths.' And from a collector's point of view it is provoking to meet with the experience that befel one of my friends, who received from a well-known entomologist specimens of the *broad-border* (which he did not want), having had them offered to him by the correct name of *bombyliformis*, but having construed that into an offer of the *narrow-border*, according to the usage of the older British authors.

12, Greenwood Road, Dalston, N.E., Jan. 3rd, 1896.

SENSES OF INSECTS.

By G. A. K. MARSHALL, F.Z.S., F.E.S.

I HAVE read with much interest the discussion lately carried on by Mr. Watson and Mr. J. Arkle on the above subject (Entom. xxviii. 30, 243). But the article of the latter gentleman calls, I think, for some remark; for with regard to several subjects dealt with therein he takes up a position which seems to me to be wholly untenable.

The writer would appear to have a grievance against entomologists in general for their laudable efforts to explain the reason of and uses for the large variety of sounds produced by the insect world; and although he is content to summarily dismiss the "stories of scientific observations" in a short and somewhat contemptuous passage, which casts a decided slur on those who made the observations, yet I notice that he offers no adequate theory or explanation to take the place of that which has fallen a victim to his iconoclastic efforts. He approaches the whole subject in a distinctly biassed and anti-scientific mood, the key-note of which is struck in the following passage:—"Nature has landscape sounds for our ears, just as she provides scents for the smell or colours for the eye." The idea which underlies that theory of the old naturalists, that fossils were only put into the rocks for the amusement and delectation of mankind, is dying harder than I thought. It would be quite foreign to my present purpose to try and combat that idea, and I will merely observe that the explanation given for the occurrence of unpleasant sounds and smells, *viz.*, that they prevent monotony, has certainly the merit of quaintness if nothing else, though I fear it would hardly stand investigation.

But, leaving the subject of general principles, I have other "bones to pick" with Mr. Arkle. He says that "sensitiveness to concussion or vibration is an entirely different thing from hearing." This I certainly cannot agree with, and it looks to me very much like a case of *petitio principii*. With all due deference I would suggest that hearing is merely a localised and highly specialised sensitiveness to vibration. In other words, that the auditory apparatus is an organ specially adapted for receiving and recording those vibrations of the air, known as sound waves, which are too delicate to be felt by the other ordinarily sensitive portions of the body. Indeed I should consider that the difference between the sense of hearing and that of touch is only one of degree and not of kind. There is little doubt that such auditory powers as are possessed by insects are of a very different character from those possessed by man, as they are not nearly so highly specialised or differentiated, and it is extremely probable that they are in many instances nearly allied to, or even combined with, the faculties of touch. I quite fail to understand Mr. Arkle's strong desire to

deny the power of hearing to all insects—a power which, from its great utility for protective purposes, one would expect to find even low down in the scale of living creatures, and which would be rapidly developed by natural selection, whenever any variation in that direction might afford it a basis to work on. Even when for a moment he does grudgingly allow that perhaps some insects may possess this faculty, he hastens to assure us that it is “most rudimentary,” and “serves no purpose as a warning and protection.” Now to my mind the existence of rudimentary hearing faculties, which are entirely useless, is an anomaly calling for an immediate explanation, with which Mr. Arkle does not seem prepared to favour us; though I must remark that their inutility is a purely arbitrary assumption. The occurrence of such rudiments, if rudiments they be, can only be accounted for in two ways, *viz.*:—(a) that they are the result of atrophy or degeneration—this explanation would point either to a wholesale degradation of insects which is not borne out by the facts, or to the assumption that a more specialised form of auditory apparatus exists or has existed even lower in the scale of nature, which I presume the writer would not be prepared to admit; (b) that they are the result of improvement and development, being the earlier links in that long chain which culminates in the complicated ear of the higher vertebrates, and in that case it is evident that they must come within the scope of, or rather owe their very existence to, natural selection. This appears to me to be the true explanation. But one of the first principles of that far-reaching law is that it can develop only such characters as are actually useful. But Mr. Arkle asserts that these rudiments are absolutely useless, which is absurd, as our friend Euclid remarks. I certainly cannot see why anyone should jump to the conclusion that any hearing powers which insects may possess must necessarily be far inferior to those of man, for in the case of two senses at all events they have a decided advantage over us. The human nose would be quite incapable of such feats as are daily performed by coprophilous beetles or the males of “assembling” moths, and the tactile powers in the body of a caterpillar or the antennæ of many insects are far more sensitive and delicate than anything we possess.

I have lately had good opportunities of observing the habits of a family of insects which numbers among its ranks some of the greatest noise-producers of the whole class; I mean the Cicadas. I have so far found some nine species of these curious and interesting Homopterans in this immediate neighbourhood, and every day as soon as the sun gets hot the bush resounds far and wide with their ear-splitting sounds, which are certainly more vigorous than pleasing. Now, as is well known, these vocal powers, if I may call them so, are confined to the males, which of itself is a highly significant fact, and, apart from all other considerations,

lends a distinct air of probability (to put it no stronger) to the theories of those who believe in the auscultory powers of insects. Mr. Arkle quite rightly argues that the possession of a sound-producing apparatus is no *proof* of the ability to hear. Yet I maintain that it is strong *primâ facie* evidence in favour of that ability; and when such apparatus is confined to one sex the evidence becomes so strong as to fully justify the assumption of hearing powers, at all events in the opposite sex. Moreover, when we come to examine the male cicada and see what a large portion of its economy is occupied by the sound-producing organs, the mind of any man who has read with ordinary intelligence the works of such authors as Darwin, Huxley, or Wallace, must revolt from any theory which would explain away this mechanism as being merely adventitious, or else supplied by the kindness of Nature for the delectation of the Kafirs in the wilds of Africa, and to prevent their being annoyed by the monotony of pleasanter sounds. Such a highly specialised apparatus must be of immense importance in the welfare of the insect in which it occurs, and can only have been produced by some very potent factor, which, as I will show hereafter, I believe to have been natural selection acting on the basis of the reproductive instinct, a most powerful combination. We have already seen that sounds are emitted only by the male sex, and therefore if it can be shown that the female seeks the male, instead of *vice versâ*, I think it will be admitted that we have very strong circumstantial evidence, amounting practically to proof, that the female can hear and is attracted by the song of the male. Now, although I am aware that by doing so I lay myself open to "the suspicion that science may end and enthusiasm begin," I must state that such observations as I have made have undoubtedly pointed to the fact that the female does seek the male. My notes have been made on only two species, which offer greater facilities for observation than the others. For it is not always easy to make accurate observations on these insects owing to the difficulty of detecting them, the sluggishness of their movements, the height at which they usually sit, and especially to the fact that the male and female are indistinguishable on the tree, unless the former happens to be singing, when the abdomen is slightly raised and the wings held at a somewhat acute angle. I have frequently watched solitary males when singing, and seen another cicada advance from some other part of the bough or trunk with its slow somewhat jerky gait, stopping every few seconds, and even passing and repassing the calling insect, until at last it comes to a rest alongside of him. On netting such insects I have invariably found them to be females, and on one occasion I took three which had gathered round a single male. I have noticed that when there are any impassive females in the near vicinity of calling males these latter after a time become restless, walking backwards, forwards, and sideways, singing all the time, and occasionally giving

a sharp flutter with their wings, as if to try and attract the attention of the females. This always reminds me of the "showing off" of many male birds. That these performances are intended for the female is well illustrated by an instance I saw only yesterday. A male cicada was singing on a small branch, and on another parallel branch, about six inches away, was a female. When I first observed him the former was sitting quite still, but he gradually worked himself up, and began walking up and down and all round his branch, occasionally giving a sharp flutter with his wings; but the female remained quite impassive. He got so excited that on three occasions he even took short flights of a few feet from his branch. I watched with interest to see if he would settle on the other one. But no; in each case he returned to his own and recommenced his serenading, which seemed to me significant. The female eventually got tired of him and adjourned to a neighbouring tree; whereupon he became quiescent, though he still continued calling.

Moreover, there is another fact which throws a very interesting side light on the matter. As I have before mentioned, I know of nine different species round here; and although there is a general similarity in the sounds which they produce, yet the differences between them are sufficient to enable me, with a little practice, to identify the species merely by hearing its cry. Why, then, should there be such a diversity of sounds if they are to serve no purpose? If, however, we acknowledge that the male utters his shrill cry for the purpose of attracting the female, the explanation of these distinctions at once becomes evident. For it is manifest that if the female finds the male by his call, and there is a number of different species frequenting the same area, those males which acquire some peculiarly distinctive sound would be likely to attract to themselves more females of their own kind, and thereby would leave more progeny, than those males whose cry more closely resembles that of another species; for these latter would be apt to attract females of the other species with which they could not interbreed. And, *pari passu*, those females which are most adept at distinguishing the notes of their own males from those of other species, are more likely to pair and leave progeny. It is instructive to note, in this connection, that the differences in the cries of two species vary in accordance with their relationship; the more nearly allied species possessing more similar calls.

Although I have several times imprisoned male cicadas in gauze-covered boxes, to see whether they would attract females by calling, unfortunately my experiments have failed so far, owing to the fact that the male has always refused to utter a sound beyond an occasional indignant squeak, quite distinct from his usual call. One day I came across a most unusual concourse of one species, there being about sixty specimens on a single small bush. With one sweep of the net I caught two males and five

females, and I then stood for a few seconds watching where the remainder were settling. Meanwhile the two males in my net were screeching vigorously, and I noticed two cicadas fly round successively and settle momentarily on the net. These I marked down, and on capturing them found them to be both females. If this be taken as an instance of the female flying direct to the call of the male, it is the only one that has come under my notice. Cicadas, however, do not seem to indulge much in flight, and considering the numbers there must be about, I have seen very few on the wing, except when they have been actually disturbed. Their sluggishness may perhaps be accounted for by the fact that these insects are perfectly defenceless, their only protection being their excellently protective colouring; and therefore their greatest safety lies in sitting still. This is a most important fact, which has been quite overlooked by Mr. Arkle in his supposititious case of *Melanippe fluctuata* remaining undisturbed by a military band, and one which often renders it very difficult to decide the true effect of sound, &c., on an insect. The fact that the moth was not disturbed by the music is no more a proof of its deafness than the fact that it did not fly away at the sight of the approaching stick (but waited to be touched) is a proof that it could not see. The great majority of unarmed insects, which are well adapted to their surroundings, sit fairly close. This is the case with the cicadas; several species allowing the branch on which they are sitting to be roughly shaken, or even struck sharply with a stick within a few inches of themselves, without moving; and yet this is no proof that they have no sense of touch. For such insects immobility is their safest course, up to a certain point.

I have so far dealt only with insects which possess a distinct sound-producing apparatus. I will therefore now take an example from those which are without such adjuncts. While strolling in the bush round my camp after dark with a lantern, in search of those giant Carabidæ, *Tefflus* and *Anthia*, I have often been attracted by a sharp pattering sound among the heaps of dead leaves. On inspection this proves to emanate from a small blackish termite. A closer investigation shows that the sound is produced by the large-headed soldiers only, which are walking about among the leaves in front of the workers, while the latter are busy building their little mud tunnels. The method in which they produce the sound is by raising themselves on their legs, and then, with a very rapid motion, striking the leaf two or three times with their heads. Now the naturalist who is worthy of the name requires some reasonable explanation for all such facts he may observe. Why do the soldiers stand in front, often exposing themselves on the tops of the leaves? and why do they strike their heads thus on being approached? Obviously they are there to guard the defenceless workers with their well-developed jaws, and to give warning, by rapping, of impending

dangers ; the truth of which latter conclusion is demonstrated by the fact that, if the disturbing element continues, the rapping will after a time grow less, until it will be found that all the termites have retired underground. If this be so, it is evident that the striking must be perceived by the workers in some way. Personally, I think they hear it, though this is almost impossible to prove ; for I can no more believe that they perceive it by the sense of touch, as we understand it, than that a man can perceive the striking of distant horse-hoofs by means of his hands rather than his ears. The soldiers, however, do not stand on such debateable ground, as they are able to give some evidence of their perceptions. It must be remembered that they are blind, and now Mr. Arkle asserts them to be deaf, thus leaving them only the senses of touch and smell wherewith to perceive the approach of their enemies. This seems to be improbable on the face of it, and I have had abundant proof that it is not the case. When the footstep of the observer falls within a certain distance of the termites, the little army becomes much perturbed, and the warning rap is energetically repeated every few seconds. If there be a fairly long row of them at work, the rap may be distinctly heard to travel along the line from its starting-point. However, unless again disturbed, they will soon quiet down. Then if the hands be clapped, the fingers snapped, a dry stick cracked, or any other similar sound made within a foot or two of the insects, the sentinels will give a sharp rap after each noise. Now I have made these experiments very many times, and always with the same result ; therefore this cannot be regarded as a mere coincidence. It may then be granted that the insects are affected by and can perceive these sounds ; in which case they must be able to hear, as that is the only sense by which they could perceive them. The sound that I have found to elicit the most prompt and energetic reply is a sharp whistle, care of course being taken to prevent the breath reaching the termites. I have known them to hear such a whistle at a distance of even six feet, which, if proportionate size be taken as a standard, would mean about half a mile in man. This example is, I think, sufficient to show the fallacy of Mr. Arkle's assertion that any hearing powers insects may possess are rudimentary, and of no use for warning purposes.

But since it has been shown that the cicada, with a complicated sound-producing organ, and the termite with none, are both equally capable of hearing, we have good reason for assuming that insects in general are possessed of the same power, and especially those that are themselves able to produce sound.

With regard to the more speculative issue, as to whether insects possess some additional sense which we have not, Mr. Arkle says that if they have such a sense it is obviously one of direction. In the first place, the obviousness is by no means apparent to me ; and, secondly, as we do possess a sense of direction, it hardly seems to come within the scope of the

argument. As, however, the evidence of so great an authority as Sir J. Lubbock has been adduced to demolish this "obvious" conclusion, I cannot refrain from making a further reference to it. Many insects, such as bees, ants, &c., possess a definite and fixed abode, from which they are in the habit of wandering, sometimes for considerable distances, in search of food. Now, if these insects have no sense of direction whatever, how can they find their way back as accurately as they do? To fall back on the old resource and explain it by instinct is merely a plausible way of saying, "I don't know." I cannot see that there is any inherent impossibility for insects to possess an additional sense. For instance, there is a vast gap between the number of vibrations in the quickest sound-wave and that of the slowest light-wave; and yet we are quite unable to appreciate or perceive the intermediate vibrations. It is, however, quite possible that such differently constituted creatures as insects might be able to do so, and thus possess a sense that man has not. Indeed, Sir J. Lubbock has shown that ants are sensitive to the ultra violet rays of light, and can probably see them. But without going so far afield, I think many insects have demonstrable senses for which we have no exact parallel. I need only adduce one instance. It is well known that the vast majority of termites have no eyes; and yet any one who has observed them will have noticed how readily they can perceive light, for which they show a strong dislike. What then is the name of the sense which enables them to do this? It cannot be sight, for they are blind. Neither can it be any of the other four senses, as we understand them, for to our ideas light has no smell or taste, and is inaudible and intangible. I must therefore leave the solution of the problem to a wiser head than mine.

Lower Umfuli River, Mashunaland.

October, 1895.

ENTOMOLOGY IN OCTOBER.

By C. W. DALE, F.E.S.

NOTWITHSTANDING the chilly winds and rains and occasional frosts which herald the approach of winter, October is, to my mind, after May and June, the best Entomological month of the year. But it is by real hard work that good insects are to be obtained; it is certainly no light task beating a lot of thatch and ivy and apple trees, and pulling moss and rubbish to pieces. It is certainly the best month in the year for three genera—*Depressaria*, *Platypeza*, and *Aleyrodes*. Besides the beautiful species of the hybernating genus *Vanessa*, the last broods of the following butterflies appear: *Pieris rapæ*, *Chrysophanus phlæas*, *Pararge egeria*, and *P. megæra*. To prevent this paper from being too long, I will mention only those species taken by myself at Glan-

viles Wootton. To begin with: by beating thatch I have obtained *Xylina petrificata*, *Theristis caudella* (*mucronella*), *Cerostoma radiatella* and *costella*, *Acrolepia pygmæana*, *Laverna decorella*, *epilobiella*, and *atra*, *Chauliodus chærophyllellus*, *Lyonetia clerkella*, *Gelechia lyellella*, *Depressaria pallorella*, *alstræmeriana*, *purpurea*, *capreolella*, *propinquella*, *subpropinquella*, *rhodochrella*, *arenella*, *atomella*, *applana*, *yeatiana*, *ocellana*, *ciliella*, *granulosella*, (*zephyrella*), *albipunctella*, *discipunctella*, *weirella*, *chærophylly*, *ultimella*, *badiella*, *nervosa*, and *heracleana*, *Psoricoptera gibbosella*, *Simæthis pariana*, and various species of *Bracon*, *Cryptophagus*, *Asteia*, *Musca*, *Mycetophila*, *Culex*, &c.

By beating ivy I have obtained *Cerastis vaccinii* and *spadicea*, *Scopelosoma satellitia*, *Miselia oxyacanthæ*, *Orthosia lota*, *O. macilentæ*, *Agriopis aprilina*, *Agrotis segetum*, *A. suffusa*, *Hadena protea*, *Anchocelis lunosa*, *A. pistacina*, *Dryops femoratus*; and swarms of *Apis vespæ* and *Eristalis tenax*, *Musca rudis* and *vomitioria*, &c., in the day time. By beating apple trees in orchard I have obtained *Cidaria miata* and *C. psitticata* (*siterata*), *Sarothrips undulanus*, *Peronea cristana*, *Leptogramma literana*, *L. scabrana*, *Cerostoma radiatella*, *Gelechia lyellella*, *Gracillaria elongella*, *Coriscium sulphurellum*, *cuculipennellum*, *Lyonetia clerkella*, *Zelleria insignipennella*, and *Alucita hexadactyla*. I have followed this work till December, and have been rewarded by taking *Exapate gelatella*. In the woods *Oporabia dilutata* and *Lemnatophila phryganella* occur commonly, and five species of the rare genus *Platypeza*—*modesta*, *rufa*, *picta*, *aterrima*, and *infumata*. The genus *Aleyrodes* occurs freely during this month: *A. brassicæ*, a pest in the gardens, and *A. spirææ* in woods. The other species are *A. prolella* on celandine, *A. lonicæræ* on honeysuckle, and a new species on columbine, *A. aquilegiæ*, which will be probably described by Mr. Douglas as soon as I can discover the larvæ. Other good species I have taken this month are *Embolemus ruddii* with its apterous female, *Myrmecomorphus rufescens*, *Alysia contracta*, *Proctotrupes brevipennis*, *Codeus apterogynus*, *Myrmica lippula* males and females, *Anomatus 12-striatus*, *Agathidium varians*, and *nigripenne*, *Phlæiophilus edwardsii*, *Larinus carlinæ*, *Haplocnemus femoralis*, *Tetratoma desmaresti*, *Cynips apterus*, *Borborus pedestris*, and the species of the winter genus, *Trichocera*, which may be seen all winter through, even dancing up and down when the ground is covered with snow. Another genus of the Tipulidæ is also out in force this month, *Amalopsis straminea* and *immaculata* occurring here, and three other species in Devonshire. *Tipula pagana*, *confusa*, and *signata* also are on the wing, as well as the last representative of the Trichoptera, *Phacopteryx tuberculosa* (*villosa*), which continues till December. I might considerably add to this list, but think I have named enough to show that collecting in October is not to be despised.

October 27th, 1895.

ON THE ABUNDANCE OF ORTHOPTERA IN THE ALPS.

By W. HARCOURT-BATH.

NEXT to the Rhopalocera, the Orthoptera are undoubtedly the group of insects which are mostly in evidence in the Alps. If they do not display their figures in such an ostentatious way as the frivolous butterflies, they fully make up for that trait by reason of the great noise they create. If they also lack the beautiful colours of their more handsome relations, they adequately compensate for any deficiency in this respect on account of the grotesque forms they frequently assume.

The grasshoppers belonging to the two families Acridiidae and Locustidae certainly constitute some of the most characteristic insect inhabitants of the Alps. They occur by far the most plentifully in the lower valleys of the mountains, especially upon their sunny southern slopes, and rapidly become more scarce the higher one ascends, until at about 9000 ft. above the sea-level they disappear altogether. They commence to make their appearance in the perfect state about the beginning of June in the warmest localities and at the lowest elevations, emerging later and later according to the altitude. August and September are the two best months for collecting them, as they are then in their greatest abundance everywhere.

The noise they produce is sometimes deafening and perfectly bewildering. I have heard their stridulations on many occasions when travelling at full speed in a fast train; and sometimes, when traversing grassy or bushy tracts wherein they abounded, it was necessary to speak in a loud tone to a companion only a few yards away to make him understand what I had to say.

The most plentiful species is undoubtedly the great green grasshopper (*Locusta viridissima*), which I have often heard stridulating in thousands on a warm evening. It is a fine sight to see this conspicuous insect flying in the bright sunshine like a large migratory locust, a habit I have never observed in our own country.

The more robustly-built *Decticus verrucivorus* I have also encountered in abundance in many localities, especially in the Rhone Valley and near Interlaken. As is well known, this insect is employed by the peasants for charming away their warts. Another large species I met with last year on the south side of the Gemmi Pass near Inden. Its stridulations possess a wonderful resemblance to the hiss of a snake, which mimetic habit no doubt serves to protect the insect from the attacks of batrachian reptiles and insectivorous birds. It is of a purplish colour, prettily striped with yellow and brown. This insect belongs to the Acridiidae, a different family to the two preceding.

The beautiful butterfly locust, *Aedipoda cærulescens*, occurs in

considerable abundance in many localities in the Alps, particularly on the limestone formation. On the south side of the Brünig Pass, in September, 1894, I encountered it in great numbers. As a rule it sits at rest on rocks and stones which exactly resemble it in colour, so that when it remains motionless it can with difficulty be detected, but when approached it invariably flies away, looking remarkably like a bright-coloured butterfly. The tegmina of this species are brown of various shades, sometimes inclining to grey; but the under wings are beautifully adorned with rich crimson, being bordered on the margins with black. A common variety has the crimson space occupied by a deep azure blue. This is another representative of the Acridiidae, which also possesses many other members, but of an average smaller size; about the dimensions of our own field grasshoppers.

One of the most beautiful species of the Locustidae I have met with is an apple-green form, of exceedingly slender shape, something like *Locusta viridissima* in appearance. I have seen specimens of it at Interlaken, at the base of the Rothhorn, sitting on the heads of various Umbelliferae, no doubt waiting for the approach of smaller insects which constitute its prey.

Crickets, belonging to the family Gryllidae, of several species occur, the commonest of which is the field-cricket (*Gryllus campestris*), which I have seen and heard in many localities. On the road between Spiez and Reichenbach I heard them stridulating in thousands in the meadows one day in July after a brief thunderstorm, the moisture produced by which they seemed to enjoy, judging by the noise they created.

These insects sit at the mouths of their holes, stridulating until the intruder approaches within a yard or so, when they suspend their orchestral performances and disappear two or three inches down their dwelling; but they can be frequently induced to show themselves again by injecting a blade of grass, which they seize in rage, and can thus be secured. On the Brünig Pass, one sultry afternoon in September, I saw several specimens running about on a bank, possibly in the act of migrating for the purpose of forming new colonies.

I have not hitherto studied or collected the continental Orthoptera, although upon the occasion of several trips across the Channel I have been strongly tempted to do so. As I contemplate undertaking an extended tour in the Alps this season, I may find an opportunity of forming a collection. For several years past I have been considerably interested in the British species of this order.

Birmingham, January 5th, 1896.

A NEW SCALE-INSECT INFESTING DATE-PALMS.

By T. D. A. COCKERELL, N. M. Agr. Exp. Station.

PARLATORIA VICTRIX, sp. nov.

♀. Scale about $1\frac{1}{2}$ mm. long, similar to *P. zizyphus* (which I find on lemons), but the true scale white (in *zizyphus* it is brownish); second skin black, bordered with pale ochreous (in *zizyphus* it is all black); first skin narrower, often pale greenish, and not so much overlapping second skin.

♂. Scale white.

♀. (Boiled in potash) nearly colourless, tinged with brown. No grouped ventral glands. Three pairs of lobes; median four rather close and equidistant from one another, the third lobes more distant from the second. Lobes having about the shape of an axe-blade, narrowest at base. Plates scale-like. Margin striate. Mouth-parts far posterior.

For the arrangement of the spines, plates, and lobes, see the figures.



Hab. On leaves of date-palm, sent from Tucson, Arizona, by Prof. Toumey. Writing Dec. 28th, 1893, Prof. Toumey says:—"I send you to-day specimens of date-palm (*Phoenix dactylifera*) infested with sp. of *Parlatoria*. . . I believe this scale was brought here on trees imported from Africa, and distributed by Department of Agriculture."

These palms were originally from Cairo, so the insect is probably Egyptian. It is curious that it has never been noticed by European naturalists; the *Aronidia blanchardi*, lately described by Targioni-Tozzetti, from date-palms in the Sahara, is evidently a different thing.

The insect was formerly considered to be *Parlatoria zizyphus*, but on comparing it with true *P. zizyphus* (found on lemons) it is evidently distinct. Mr. Pergande, of the Entomological Division at Washington, has re-examined it from material I sent, and is now also of this opinion.

Las Cruces, New Mexico, U.S.A.

Feb. 5th, 1895.

LEPIDOPTERA AT LIGHT AT IPSWICH.

BY CLAUDE A. PYETT.

A REVIEW of the past season, through the means of a carefully kept diary, shows that it has been exceptionally productive of Lepidoptera, especially as regards collecting at light. The year has been remarkable from the fact that usually common species, such as *Mamestra brassicæ* and *Rumia luteolata*, have been scarce, and in some instances, for example *Agrotis segetum*, I have not seen a single specimen. *Melanippe fluctuata* was the only insect that maintained its proverbial frequency in these parts; *Noctua c-nigrum*, which I referred to last year as a pest, being comparatively uncommon. A few species occurred plentifully, *M. persicariæ* being the most conspicuous.

That the season has been successful is proved by my having taken no fewer than 199 species, made up as follows: Diurni, 1; Sphinges, 3; Nocturni, 11; Drepanulidæ, 2; Pseudo-Bombyces, 6; Noctuæ, 66; Geometræ, 62; and Micros, 48. Dealing with the latter separately, *Pionea forficalis*, *Crambus hortuellus*, and *C. tristellus* swarmed, but with these exceptions none of the others abounded. On the whole, the best Macro taken for the county is *Leucania phragmitidis*, of which I took two specimens in one night with *Dianthæcia carpophaga*, likewise an apparently scarce insect in this locality. Among the Micros, *Spilonota roborana* and *Ephestia? passulella* are new to the Suffolk list, whilst I have to record the capture of *Tinea pallescentella* for the first time this year in the county. Several specimens of *Dicranura bifida* and *Smerinthus ocellatus* occurred; of the former I took four. One *Amphidasys betularia* of the true var. *doubledayaria* form fell to my lot.

The autumn season was a decided contrast to 1894, insects being noticeably scarce, although the weather was not unfavourable. Of the few species recorded, *Xanthia gilvago* was present in unusual numbers, also *Eugonia fuscantaria*, but I only secured one *E. alniaria* (*tiliaria*), the commonest of the 1894 "thorns." It is remarkable, bearing in mind the central situation of the two electric arc lamps in the town, that this illuminant should be occasionally visited by such insects as *Hepialus humuli* and *Acentropus niveus*. An Ipswich entomologist, in the November issue (*Entom.* xxviii. 314), comments on the superiority of the electric light over gas as a means of attracting insects, but my experience has been the reverse. To bear this out, it would have been interesting to tabulate the insects taken respectively at the two sources of light; but as this would occupy so great space, I have instead carefully summarised the relative differences. Thus, of Lepidoptera taken, 66 species occurred at both illuminants, whilst 81 were captured through the medium of lamps, and 52 only at electric light. The introduction of the brilliant incan-

descent gaslight dates only towards the end of September, otherwise this might be thought attributable, although, apart from this, there is every reason to suppose that its adoption will tend to diminish the visitants to the arc lamps, as will be seen by reference to the closing months of the year in the following list, in which I have specified under each month the captures at each light, it being understood that in those cases where not otherwise stated the insects were taken at both.

February.—*Hyberia rupicaprar*.

March.—*Phigalia pedaria*, *H. progemma*, *Anisopteryx æscularia*.

April.—*Tæniocampa instabilis*, *T. stabilis*, *Selenia bilunaria*, *Biston hirtaria*, *Amphidasys strataria*, *Hemerophila abruptaria*, *Eupithecia vulgata*, *E. abbreviata*, *Melanippe fluctuata*. Lamps only: *Xylocampa areola*. Electric light: *T. cruda*, *Diurnea fagella*.

May.—*Arctia lubricipeda*, *A. menthastri*, *Acronycta psi*, *M. brassicæ*, *Apamea basilinea*, *Grammesia trilinea*, *Caradrina morpheus*, *Agrotis exclamationis*, *Noctua rubi*, *T. gothica*, *Hadena trifolii (chenopodii)*, *H. oleraceæ*, *Plusia gamma*, *Rumia luteolata*, *Odontopera bidentata*, *Melanippe sociata*, *Coremia ferrugata*, *Pionea forficalis*, *Alucita hexadactyla*. Lamps: *Pieris rapæ* (to gas in church), *Smerinthus populi*, *Notodonta camelina*, *Culix glaucata*, *T. gracilis*, *Cucullia umbratica*, *Eupithecia nanata*, *E. assimilata*, *Hypera rostralis*, *Botys urtica*, *Ecophora pseudo-spretella*. Electric light: *Sphinx ligustri*, *Smerinthus ocellatus* (several seen), *Dicranura bifida*, *D. vinula*, *N. dictæa*, *N. ziczac*, *Acronycta megacephala*, *H. pisi*, *H. adusta*, *Amphidasys betularia*, *Emmelesia affinitata*.

June.—*Bryophila perla*, *Leucania pallens*, *M. persicariæ*, *Miana furuncula*, *C. alsines*, *Noctua augur*, *Acidalia virgularia*, *A. aversata*, *Eupithecia rectangulata*, *E. fraxinata*, *Cidaria dotata*, *Pyrallis glaucinalis*, *Crambus tristellus*. Lamps: *Leucania impura*, *Axylla putris*, *Apamea unanims*, *Agrotis puta*, *A. corticea*, *Euplexia lucipara*, *Hadena thalassina*, *Plusia chrysitis*, *A. bisetata*, *A. trigeminata*, *Cabera exanthemaria*, *Lomaspilis marginata*, *E. succenturiata*, *Melanippe montanata*, *Coremia unidentaria*, *Hermia nemoralis (grisealis)*, *Cataclysta lemnata*, *Spilodes cinctalis*, *Scopula olivalis*, *Crambus pratellus*, *C. perlellus*, *Schænobius forficellus*, *Tortrix rosana*, *Penthina pruniana*, *P. cynosbana*, *Xanthosetia hamana*, *Pterophorus pentadactylus*. Electric light: *Orgyia pudibunda*, *Pygæa bucephala*, *Acronycta aceris*, *Noctua festiva*, *Uropteryx sambucata*, *Panagra petrararia*, *Pyrallis farinalis*, *Scoparia ambigualis*, *S. cembra*, *S. mercurella*, *C. hortuellus*, *Tortrix heparana*, *T. ribeana*, *T. podana*, *T. viridana*, *Carpocapsa pomonana*, *Tinea pallescentella*.

July.—*Lithosia lurideola*, *Chelonia caia*, *Liparis auriflua*, *L. salicis*, *Bombyx neustria*, *Leucania phragmitidis*, *Agrotis tritici*, *Boarmia repandata*, *B. rhomboidaria*, *Halia wavar*, *Parponyx stratiotata*. Lamps: *Hydræcia nictitans*, *Xylophasia lithoxylea*, *Miana strigilis*, *M. furuncula*, *Cosmia trapezina*, *Dianthæcia carpophaga*, *Larentia didymata*, *Eupithecia oblongata*, *E. subfulvata*, *E. sobrinata*, *Hypsipetes elutata*, *Coremia quadrifasciaria*, *Botys ruralis*, *Scopula lutealis*, *Ephestia elutella*, *E. passulella*?, *Aphomia sociella*, *Tortrix ministrana*, *Peronea variegana*, *Spilonota roborana*, *Tinea tapetzella*. Electric light: *Hepialis humuli*, *Lasiocampa quercifolia*, *Platypteryx fulcula*, *X. monoglyphu (polyodon)*, *Mamestra anceps* (seen), *Triphæna pronuba*, *Selenia bilunaria var. juliana*, *Acidalia scutulata*, *Timandra amatoria*, *Cabera pusaria*, *Abraxas grossulariata*, *Ligdia adustata*, *Aglossa pingui-*

nalis, *Acentropus niveus*, *C. culmellus*, *Dictyopteryx bergmanniana*, *Hyponomeuta cagnagellus*, *Depressaria chærophylli*, *Endrosis fenestrella*.

August.—*Heliophobus popularis* (several), *Luperina testacea*, *Agrotis nigricans*, *Noctua c-nigrum*. Lamps: *L. cespitis*, *Eugonia tiliaria*, *Aspilates ochrearia*, *Cidaria truncata*, *C. immanata*, *Anaitis plagiata*. Electric light: *Triphæna comes*, *T. ianthina*.

September.—*Xanthia fulvago*, *Polia flavicincta*, *Chesias spartiata*, *Stenopteryx noctuella*. Lamps: *Noctua xanthographa*, *X. gilvago*, *X. ferruginea*, *Catocala nupta*, *Eugonia fuscantaria*, *Thera variata*, *Cidaria miata*. Electric light: *Nonagria lutosa*, *Noctua glareosa*.

October.—Lamps: *Hydræcia micacea*, *Anchocelis pistacina*, *A. litura*, *Miselia oxyacanthæ*, *Oporabia dilutata*, *Thera firmata* (13th!), *Eubolia cervinaria*, *Depressaria applana*.

November.—*Hybernia defoliaria*, *Cheimatobia brumata*. Lamps: *Pæcilocampa populi*. Electric light: *H. aurantiaria*. — CLAUDE A. PYETT; Ipswich, November, 1895.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

BY W. F. DE VISMES KANE, M.A., M.R.I.A., F.E.S.

(Continued from p. 19.)

HECATERA CHRYSOZONA, *Bork*.—Included in the Rev. J. Greene's list of Irish Lepidoptera, but without data given. Several, both larvæ and imagines, have been taken at Clonbrock (*R. E. D.*). Said to have been found on shores of Lough Foyle by Curzon.

HECATERA SERENA, *Fb*.—Very local, and usually scarce. Specimens with the central band broad and dark, and the white of the base and subterminal area reduced in size, occur. One var. *leuconota* at Cappagh, Co. Waterford. Portrane, somewhat abundant (*F. N.*); Howth (*B.*), Killiney (*S.*), Co. Dublin; Tinahely (*Bw.*) and Greystones, Co. Wicklow; Belfast (*Bw.*), Cromlyn, Co. Westmeath (*Mrs. B.*); Ardrahan (*Miss N.*) and Clonbrock, two (*R. E. D.*), Co. Galway; Roches Point, Cork.

POLIA CHI, *L.*—Widely distributed and frequently common. Neither the grey var. *suffusa*, Tutt, nor var. *olivacea*, St., nor Mr. Porritt's melanic form has been taken. The black network and α mark are sometimes faintly but often strongly marked, the females being greyer. The most dingy specimen I have comes from Ardrahan, Galway. I have noticed considerable numbers very conspicuous on the black basaltic rocks about Downhill, Co. Derry, no protective colouring being noticeable.

[POLIA FLAVICINCTA, *Fb*.—Mr. Birchall never took this insect in Ireland, I understand. He gave Co. Wicklow as a locality on hearsay evidence, but there is every possibility that it may turn up.]

DASYPOLIA TEMPLI, *Thnb.*.—Mr. Birchall took six at light once at Howth, and detected the larvæ not unfrequently. Dr. Hart also has a specimen taken there. Glenarm Castle, Co. Antrim; Greencastle, Inishowen (*W. E. H.*); Clonbrock, one (*R. E. D.*).

EPUNDA LICHENEA, *Hb.*.—Common at Howth. Mr. M. Fitzgibbon took an interesting aberration of purplish grey tone there, but not like the handsome purple-spotted variety found about Plymouth, &c. Very abundant at Rossbeigh, Co. Kerry (*Salvage*).

EPUNDA LUTULENTA, *Bork.*.—The type does not occur in Ireland to my knowledge. It is noticeable that in the English typical form the shaded nervures and row of spots of hind wings, generally present in the two following varieties, are wanting. Vars. *luneburgensis*, *Frr.*, and *sedii*, *Gn.*, are the representatives in Ireland of this species. Mr. Tutt (*Brit. Noct.* p. 53), in treating of the former variety, has very ably cleared up the difficulty and confusion into which I was led (*Entom.* xxvii. 14) by Staudinger's misdescription of var. *luneburgensis*, *Frr.*, and has made it very plain that Freyer's name should be attached to the almost black form taken in Ireland, Scotland, and in several places in England. Mr. Tutt notes Morpeth, Mr. Hodgkinson took it in Lancashire, and Mr. Bond had it from Cambridgeshire. In a letter, he said:—"I have two males and two females with the wings nearly black, and markings very faint or wholly wanting. They look at first sight like *E. nigra*. This seems to be the most prevalent variety in the southern portion of England." He also describes three var. *sedii* from Wales as "of silvery ash colour, with the same markings as var. *luneburgensis*." Both the varieties thus described occur in Ireland, sometimes in considerable abundance. By the distribution in England and on the Continent it seems evident that they are phylogenetic varieties, and their occurrence without the type in Scotland and Ireland is not the result of any climatic influences at present subsisting, nor has any bearing on the origin of recent melanic forms. It is worth noting that as the almost unicolorous brown type is locally attended by its grey unicolorous var. *consimilis*, *St.*, so the well-marked var. *luneburgensis*, with spotted and rayed hind wings, is accompanied by a grey form *sedii* with parallel characters. Such phenomena often throw light on zoological problems. I have had much assistance from Mr. Dobree, of Beverley, in studying the various forms of this species. Var. *luneburgensis* occurs on both shores of the Foyle, Co. Derry; at Kilderry (*C.*), Magilligan, and Castlerock, where Mr. Bristow took it (Mr. Birchall's record of Wicklow being an error). Var. *sedii*, *Gn.*, also is taken at the Foyle localities, and I have specimens from thence of the trivial var. *tripuncta*, *Frr.*, with small pale spots in the reniform; and one approaching var. *albidilinea*, *Tutt.* At Knocknarea, near Sligo, Mr. Russ took both

varieties in considerable numbers, and with a considerable range of variation, some of the former having a considerable tinge of the typical ground colour, while some of the *sedî* being (as also at Ardrahan) of brownish grey tone. Birchall took some form of *lutulenta* at Kilcornan, and both vars. are at Ardrahan (*A. G. M. and Miss N.*). Both also near Crossmolina, Co. Mayo (*S. R. F.*).

EPUNDA NIGRA, *Haw.*—I have never seen Irish examples of this insect. Birchall gives "near Dublin and Galway" (probably Kilcornan) as localities. At Ballycastle, Co. Antrim, Curzon met with it, and sparingly also at Magilligan (*Salvage*). Mr. Meek got it from Glengariff, Co. Kerry. Thus it seems extremely localised, but found in the extreme north and south, east and west of Ireland.

(To be continued.)

NOTES AND OBSERVATIONS.

SOME RECENT AUCTION SALES.—SECOND PORTION OF DR. WHEELER'S COLLECTION.—*Pachnobia alpina*, of which fewer seem to be now taken, in lots of 4, 7, and 8, with others, fetched 26/–, 42/–, and 45/–. *Dianthæcia barrettii* is also advancing in price, 11 specimens realising something like 8/6 each, which does not quite represent their true value, some of them being, as is, alas, so often the case in this species, in very poor condition. Two lots of 4 each of *Xylina conformis* made 47/6 and 35/–. Lots of 3 and 5 of *Cucullia scrophulariæ*, with others, 27/6 and 22/–. A pair and two triplets of *C. gnaphalii*, all of Tester's taking from Tilgate Forest, with other "sharks," went for 40/–, 35/–, and 30/–. The gem of this portion of the sale, judging from price, appeared to be a specimen of *Ophiodes lunaris*, taken at light by Dr. Wheeler himself, at Stratton Strawless, Norwich, in 1879, duly recorded, and which fetched £6; and a specimen of *Catephia alchymista*, 1895, 65/–. Four pairs of *Cleora viduaria* realised 25/–, 32/6, 18/–, and 16/–, the difference in condition being commensurate with the prices. The *Micros* were not in first-class condition, and, as is usual in such cases, went for next to nothing, two and three lots having to be bracketed together containing often as many as three hundred insects, going for 3/–, 5/–, and 10/– a lot.

MR. W. FARREN'S SALE.—The extensive collection of Mr. W. Farren, of Cambridge, was sold on Nov. 19th and Dec. 2nd. The collection looked as if it had been a little neglected of late, and there was a trace of mould in many places; but on the whole the insects were in good order, and the collection contained, without doubt, the finest series of Fen forms sold at Stevens's auction-rooms for a long period. A series of vars. of *Papilio machaon*, including specimens with band of hind wings reaching cell, discoidal spot of hind wings obsolete, red in lunules, &c., made 30/–, and a fine asymmetrical var. 21/–. The clearwings were in good order, and, as usual, brought good prices. Lot 29, including a pair of *Sesia vespiformis*, went to Mr.

Janson for 35/-. Two small lots, including 3 and 4 specimens of *S. sphegiformis*, as usual, from Tilgate, went for 30/- and 32/6; both to Messrs. Watkins and Doncaster, who indeed, with the one exception above stated, purchased the remaining 3 lots of the Sesiidæ at 30/-, 20/-, and 14/- a lot. Three bred specimens of *Deilephila galii* from the late W. H. Tugwell, with 11 *Sphinx ligustri*, went for 8/-, about the cheapest lot in the sale. The one specimen of *D. livornica* was evidently not much believed in, as with 52 other insects it only made 8/-. *Nola centonalis*, which has apparently disappeared under the influence and ardour of golfists, is also quickly rising in price, 3 lots of 4 each, also from Mr. Tugwell, made 25/-, 25/-, and 20/- a lot. Curious vars. of *Arctia menthastri*, one with purple shot and one with buff fore wings, distinct from anything of the kind I have seen before, were not dear at 32/6. The *Lælia cænosa*—two pairs—were poor, and therefore only realised 10/- and 14/-. A fine series of *Notodonta chaonia* and other prominents, including dark vars., fetched 47/6. Mr. Farren's series of *Bryophila impar* was, I should think, the finest in existence; lots of 4 or 5 each, with other things not by any means rubbish, made 22/-, 21/-, 45/- (including nice ochreous *B. perla*), 30/-. Ditto, 18/-, 26/-, 22/-, and 18/-. The wainscots were all in good order, 2 lots; including dark forms of *Arsilonche venosa*, with other things, went for 20/- and 21/-. A pair of *Tapinostola concolor*, with *T. elymi* and *Nonagria neurica*, for 28/-. A single female *Noctua subrosea* for 22/. Seven *Pachnobia alpina* and others, 21/-. A nice series of *Xanthia aurago* and *Cirrhædia xerampelina*, 26/-. The Geometræ contained nothing very striking except a fine var. of the disappearing *Cidaria sagittata*, in which the dark bands were nearly obsolete. I should think such a var. practically unique, and it certainly was not dear with 19 very fine typical *sagittata* and other things at 65/-. *Cidaria reticulata* fetched about 10/- each. Two specimens of *Polyommatus dispar*, collected by the late Jno. Curtis, were also included in the sale; they were both undersides, and in medium condition; one fetched 2 guineas, the other £2. The Tineæ, although in very nice condition, went for poor prices: and in very many cases 2 lots had to be joined before a purchaser could be obtained. Messrs. Fletcher and Banks pretty well divided this part of the collection between them. The highest priced lots were those containing *Gelechia divisella*, which went for 22/-. *Doryphora lucidella*, *D. morosa*, and others, 20/-. *Acrolepia betulella*, &c., 42/-. *Nepticula cryptella* and others, 30/-. The new *Cataplectica farreni* were sold in lots of 4, and made 7/-, 8/-, 10/-, and as low as 6/- a lot.

MR. W. H. TUGWELL'S SALE.—On Dec. 10th the first portion of the late Mr. W. H. Tugwell's collection was sold. Mr. Tugwell and his collection have been household words with most of us for many years past. He did not retain long series, but the specimens were mostly picked, and embraced good varieties and local forms. Many series were bred by himself or his friends. Granting this, it is perhaps not remarkable that record prices were obtained in more than one or two instances. At the same time I think the collection was a little overcatalogued, and I am inclined to think that it is a mistake not to leave the cataloguing in every case in the hands of the profession. I noticed in one instance (lot 18), that whilst a second-

rate var. of *Argynnis selene* with confluent spots was specially mentioned, a specimen of, to my mind, a far rarer variety, showing a silver blotch on the upper surface of the wing, was not mentioned. Some one, however, spotted it, as the lot fetched 50/-, and even at that price Mr. Janson's customer may be congratulated on having secured a bargain. To take the collection in order:—Lot 4, a specimen of *Pieris daptidice*, taken at Dover in 1851, by Mr. Foxcroft, dusky with age, was acquired by the writer for 11/-; two other good ones, with no history, 8/- and 6/- each. Lots 7 and 8, which were combined, contained what was described as a "magnificent" male *Colias edusa*, showing a rose-magenta shot colour; this, to my mind, was nothing more than the rose-shot colouring which is not at all uncommon in this species. Apparently others thought so too, as the 2 lots together, containing 52 specimens, only fetched 10/-. Lot 10 was a great bargain: a specimen of *Argynnis adippe* from Devonshire, 1874, in which the outer half of the primaries was suffused, making a rather striking variety, realising only 20/-. Possibly Mr. Janson's determined bidding may have induced others to leave off the contest too early; it was, to my mind, quite as good a variety as one sold a few sales back for something like £6. Mr. Tugwell's specimen of *Anosia plexippus*, captured by Mr. Saundry, Cornwall, 1886, sold for 35/-. Four *A. latonia*, Kent, all fine, but with no other history, fetched 12/-, 8/-, 8/-, and 6/- each. Lot 16, containing a fairly good variety of *Argynnis euphrosyne* and a slightly dusky female *A. selene*, with a rather pretty lot of *Melitæa artemis*, fetched 16/-. Lot 17, about similar, 12/-. Lots 19, 20, and 21 each contained a dull lilac or purple-brown variety of *Vanessa urticae*, and realised 21/-, 14/-, and 10/-. In lots 22, 23, and 24 were, amongst other things, specimens of *Apatura iris*, described as New Forest white-banded, Chattenden yellow-banded, a distinction I believe pretty constant in those localities; they were quite ordinary forms, and fetched 16/-, 18/-, and 12/-. The collection contained two specimens of *Vanessa antiopa*, both taken by Mr. Sang, Darlington, 1873. One nice specimen made 18/-, and one with yellow borders 16/-. Lots 27, 28, and 29 were sold together for 10/-. The pale variety of *Arge galatea*, as per catalogue, was only a faded female, but the lot was cheap, containing as it did some nice forms of *Erebia blandina*, well spotted. There were 8 specimens of *Polyommatus dispar*; the first 3 males were small and in moderate condition, but were cheap nevertheless at 45/-, 55/-, and 63/-; a richly coloured male made £5, and a large male from Mr. Howard Vaughan's collection 7 guineas, which is, I believe, a record price; the latter two were bought by Mr. Janson. A fine female made 70/-, but the magnificent variety of the female from Mr. H. Vaughan's collection had been evidently "faked" at some period of its existence; it looked as if it had been carelessly mended and blotched with shellac or some such substance, which had been subsequently removed, leaving scaleless stains. It was a pity such a fine large specimen of this rarity should be so spoilt; it was bought for 45/-. The eighth example, a fine female, was also bought by a prominent dealer for £6, and was fully worth it too. The first pair of *Lycæna acis*, from Mr. J. G. Ross, fetched no less than 35/-; the second pair, including a large female from Mr. Evan John, Llan-

trissant, was bought by the writer for 30/-. It is curious to notice how this insect fluctuates in price. I believe Mr. H. Vaughan's 11 fine specimens were sold in one lot, and only made something like 3/- each; at the Rev. H. Burney's sale, in November, 1893, 9/- each; Downing's sale, October, 1894, 6/- each; Jenner Weir's sale, May, 1894, 10/- each; at Machin's sale, February, 1895, one pair, 40/-, and a pair and an under side, 50/-: at Robson's sale, 18/- each; and at Dr. Wheeler's sale, July, 1885, only 6/- each. Personally, I believe, even at 15/- apiece, good, well-authenticated specimens are cheap; but, as it occurs fairly freely on the Continent, its price will never approach that of *Polyommatus dispar*. *Lycæna arion*, for about the first time, were sold in pairs, and made 8/-, 6/-, 7/-, 8/-, 11/-, 9/-, 7/-; triplets, 10/- and 10/-. Two Torquay *Deilephila livornica*, from Mr. King, 20/- and 7/-; one from Dr. Knaggs' collection, 13/-. Three lots of *D. galii* (4 in a lot), bred by Mr. Tugwell, 21/-, 42/-, and 40/-. One *Charocampa celerio* from Brighton, 26/-. *Sesia scoliiformis*, of which there were 12 specimens, realised an average of about 6/-. The burnets were all good: three lots each, including 6 *Zygæna exulans* and yellow *Z. trifolii*, made 35/-, 55/-, and 42/-. Vars. of *Z. lonicæ* and *Z. filipendulæ*, 50/-, 84/-, and 65/-. The unique British example of *Syntomis phegea* went to Mr. Banks for 60/-. *Nola centonalis* made about 4/6 each. Three lots of 6 *N. albulalis*, with the IVI var. of *Setina irrorella*, 30/-, 30/-, and 35/- a lot. Two specimens of *Deiopeia pulchella*, 11/- and 30/-. A var. of *Arctia caia* with dark fore wings, hind wings with blue-black band, made 35/-; and a specimen described as a unique var., with black hind wings, but which was to my mind much over-estimated, 95/-. Series of vars. of *Arctia caia* and *villica*, 52/6, 63/-, and 35/-. Mr. Tugwell was noted for his success in breeding fine forms of *Spilosoma lubricipeda*, and especially the vars. *eboraci*, *radiata*, and *fasciata*; his cabinet series, sold in lots of 8, made 25/-, 25/-, and 35/-; whilst a splendid radiated var. of *S. menthastri* from Dundee made 60/-. Eight old fen forms of *Ocnèria dispar*, 32/6; three pairs of *Lælia cænosa*, 12/-, 12/-, and 18/-; and an exceptionally large male, 15/-. Three Cannock Chase *Lasiocampa ilicifolia*, 32/6, 37/6, and 47/6. Three lots of *Drepana sicula*—three in a lot—35/-, 32/6, and 32/6. Ditto of *Dicranura bicuspis*, all from Tilgate, 33/-, 27/6, and 27/6; and a pair, 18/-. Two *Leucania vitellina*, 22/- and 26/-. Two *L. albipuncta*, 30/- and 28/-. Two lots of 4 *Tapinostola concolor*, from Mr. Vipan, 14/- and 16/-. Four lots of 2 and 3 bred *Xylomiges conspicillaris*, 16/-, 20/-, 22/-, and 18/-. Two pairs of *Laphygma exigua*, 40/- and 35/-. Two lots of 3 each of *Pachetra leucophæa*, 12/- and 14/-. Two pairs of bred *Nonagria sparganii*, from Mr. Sidney Webb, 18/- and 16/-. Three pairs of *Crymodes exulis*, 18/-, 27/6, and 28/-. A specimen of *Hydrilla palustris*, with a doubtful record, 21/-. Two lots of 5 *Agrotis ashworthii*, with 4 *A. pyrophila* and others, 16/- and 17/-. Two pairs of *Noctua subrosea*, out of which there was only one good specimen, 80/- and 30/- a pair. Two lots of 6 each of *Pachnobia alpina*, with other things, 22/- and 32/6. Two specimens of *Cerastes erythrocephala*, 12/- each. Three pairs of *Dianthæcia barrettii*, 28/-, 25/-, and 30/- a pair. Two of *Polia nigrocincta*, 5 in a lot, 21/- and 30/-. Two lots of 4 each of *Xylina conformis*, bred by Mr. Tugwell, 50/- and 42/-. One specimen of *Cucullia gnaphalii*, also

bred by Mr. Tugwell, the astounding price of 55/-. I suspect there was some sentimental reason for such a high figure; and yet there must have been two bidders at least. This must be an easy record. A single specimen of *Thalpochara ostrina*, with no history, went for 14/-. Two pairs of *Plusia moneta*, with 3 *P. bractea* and others, 32/6 and 45/-; and a single specimen of *Ophiodes lunaris*, taken at Hailsham, May, 1875, 95/-. The last few lots in the sale were extended series contained in store-boxes: *S. lubricipeda* var. *fasciata*, with parent moths, made 20/-; ditto, *fasciata* and *eboraci*, 21/-; ditto, *radiata*, 16/-, 12/-, and 16/-; ditto, *eboraci* crosses, 26/- and 21/-. Lots of 6 each of *Zygena exulans*, 14/-, 12/-, 12/-, 14/-, and 16/-. Two fine spotless pale vars. of *Venilia maculata*, with others, 65/-; and a lot containing fine varieties of the thorns, 50/-. Altogether, the first portion of the sale, without any cabinet to swell the total, realised £311 3s.—THOMAS WILLIAM HALL; Stanhope, The Crescent, Croydon.

[The following note from Mr. Adkin may be added as a postscript to the above.]

The remaining portion of the collection formed by the late Mr. W. H. Tugwell, together with cabinets, &c., was disposed of on Jan. 20th, and realised upwards of £150, the most important items being:—Three *Cleora viduaria*, taken by the late Chas. Tester in Tilgate Forest, £1 17s. 6d.; two *Boletobia fuliginaria*, bred by Mr. Tugwell, £2 7s. 6d.; and seven other specimens at a similar rate. A black white-banded variety of *Abraxas grossulariata*, brought the lot in which it was contained up to £1 10s., as did a fine example of *Sterrhia sacraria* to £1 6s. Four *Phibalapteryx polygrammata* sold for £1 10s.; twelve *Cidaria reticulata* at an average of 9s. 6d. each; and two *Margarodes unionalis*, taken by Mr. Tugwell at Deal, for £2 15s. and £1 10s. each respectively; while two *polygonalis*, with a similar history, brought the unprecedented prices of £4 15s. and £3 3s.—R. A.

PALEARCTIC RHOPALOCERA.—As I am collecting data respecting the geographical and vertical distribution of these, I shall be much obliged for local lists of species, with notes, from those who have collected abroad, especially from Russia, North Africa, and Armenia. Lists from all the European countries will be very acceptable.—W. HARCOURT-BATH; Ladywood, Birmingham.

POLIA CHI AND ITS VAR. OLIVACEA BRED FROM THE EGG.—In the early spring of 1895 I had some eggs deposited by females of the type and *olivacea* forms of this species sent to me from Durham. The male parents were unknown. The eggs began to hatch at the end of April, *olivacea* being first by three or four days. I found the larvæ would eat dock, hawthorn, oak, and groundsel. As they preferred groundsel, I fed them almost entirely upon it. The caterpillar is fully and accurately described in Newman's 'British Moths.' Although I examined the larvæ on several occasions, with the help of a strong lens, I found not the slightest difference between *chi* and *olivacea*, which, of course, were kept in separate flower-pots. The *olivacea* all pupated by June 15th, the *chi* by June 24th. Some of the latter, late ones, died of diarrhœa. On June 26th there was a severe thunderstorm, with heavy

rain, and all the pots were submerged for about half an hour in water. This had little or no effect upon the pupæ, every one of which, I should say, produced a moth. *Chi* were the first to show themselves, from Aug. 4th to 14th. Imagines of *olivacea* appeared from Aug. 10th until Aug. 22nd. Several of the *chi* pupæ produced the var. *olivacea*, but none of the *olivacea* produced *chi*. Many specimens of the variety were so dark an olive-green as to be almost black, the white markings showing up handsomely on the dark ground. In the Chester district, North Wales included, I take the species (but never the variety) chiefly from the old walls of Beeston Castle, on a high wooded precipitous hill to the left of the railway between Crewe and Chester. The form for this district is pale and weakly marked in comparison with the handsomer Durham one. At Beeston, on Aug. 14th and 17th, I took altogether twelve *P. chi* from off the castle walls, where the moth rests during the day. These were chiefly for pairing purposes. The results were as follows:—*Chi*, either from Beeston or Durham, or when crossed by each other, paired readily, and I got plenty of eggs; *chi* crossed with *olivacea*, or *vice versa*, paired badly, and I only got about twenty eggs; *olivacea* failed. One of the females laid a dozen or more infertile eggs.—J. ARKLE; 2, George Street, Chester.

POLIA NIGROCINCTA BRED FROM THE EGG.—In March, 1894, I received thirteen eggs of *P. nigrocincta*. The parent moth had been taken the previous season by Mr. Murray, of Carnforth, in the Isle of Man. The eggs began to hatch on April 19th. Although the larvæ had every attention, and full choice among the prescribed food-plants,—different campions, violet, harebell, plantain, &c.,—they ate very little, and died, one after the other, up to July 24th. A second batch of thirteen eggs, in 1895, hatched April 26th. The egg is dome-shaped, pale purplish brown, with a considerable apical zone of the same colour, but much deeper in tint, almost black. It is ribbed, the ribs standing out prominently, especially from the centre of the apical zone. In the centre of this black-purple-brown zone is a raised dot. From this dot spring the raised ribs, nine or ten in number. These presently subdivide, and spread longitudinally over the bulk of the shell. The stages I observed in the growth of the caterpillar are the following:—First (after hatching): One-eighth of an inch long; a few bristles on each segment. To the eye the caterpillar appears the width of a fine stroke with the pen. Head pale, clouded with light brown. Body pale dull green, also claspers. First five segments (after the head) dark purple, dorsally, but this is not a constant character. Each segment has four dorsal black spots, and two on each side. These spots form two dorsal lines and a line along each side. In walking the larvæ loop like geometers, and, if alarmed, sit up in the form of the letter S. Both these characteristics are observable in *P. chi*. Second stage: Head green and clouded with yellowish. Dorsally the segments are dull dark green. Below the spiracles the colour, including the legs and claspers, is bright apple-green. Along the whole of the dull dark green dorsal area is a central whitish-green line. There is a similar line along each side, the side lines being just situated in the dull green dorsal area. The four dorsal spots each emit a minute bristle. The segment divisions are clearly marked dorsally in whitish

green. The head is smaller than the following segment, and the caterpillar tapers towards the extremity. It does not like microscopic examination, and starts off rapidly when the lens is above it. Third stage: Green, with a not very distinct yellowish-green stripe along each side containing the spiracles. The spiracles are yellow, surrounded by black rings. Fourth stage: In 1894 this stage was reached June 17th; in 1895, a much warmer season, on May 29th. Head, segments, claspers, apple-green. There is a thin whitish yellow medio-dorsal line, and an exactly similar line on each side of the larva. Below the side line, and including the spiracles, is a broad yellowish white stripe. The spiracles are white-yellow with black rings. The four dorsal spots on each segment are white-yellow. The geometer-like character of looping is now lost. To the eye the caterpillars appear apple-green, with a yellow stripe or line along each side. They never got beyond this stage with me in 1894. Fifth stage: June 11th, 1895. The head and second segment are pale brownish green, with darker markings. The second segment is mottled on the sides with brown. The dorsal area of the remaining segments is olive-green, conspicuously mottled with warm reddish brown. Segment divisions reddish. Each segment has, dorsally, four dark brown spots, with dull yellowish centres. There is a dull yellow stripe along each side containing the reddish spiracles, which are surrounded by black rings. The caterpillar is green underneath, slightly mottled with brown. Legs pale reddish brown; claspers green. The caterpillar has now reached its final stage. Seen without the aid of a lens it appears as follows:—The head is pale greenish brown, and slightly smaller than the second segment. The body is cylindrical and reddish olive-green dorsally. The red tint predominates, and resembles the deep blush on a ripe apricot. When moving about the segment divisions are more exposed, and are of a brighter red than the back of the caterpillar; along each side there is a dull yellow stripe; these side stripes have a waved appearance, as if composed of a series of crescents, one crescent on each segment. The legs are pale reddish brown, the claspers green. Newman, in his 'British Moths,' p. 395, remarks upon the similar appearance of the caterpillar, doubtless when fully grown, to that of *Epunda lichenea*. I compared his description of the latter species (p. 400) with my *P. nigrocincta* larvæ on July 17th. The chief points of difference are that in *P. nigrocincta* the head is "tessellated" with darker markings; secondly, the back of the caterpillar is without indistinct lozenge-shaped oblique marks. Thirdly, the dorsal reddish colour in *P. nigrocincta* is very pronounced. Still it may be very easy to confound the species. The larvæ preferred groundsel to everything else. They began to pupate on June 13th. Here the curtain drops on their history, for they never appeared again. I did not rear a single moth. True their pots were submerged in the heavy triple thunderstorm of June 26th. But I certainly expected them to follow some sort of suit to *P. chi*, and show a moth or two at least. It seems to be a difficult species to rear from the egg, and I shall be glad to hear if this has ever been done.—J. ARKLE; Chester, Jan. 2nd, 1896.

SOME CONTINENTAL VARIETIES OF BRITISH SPECIES RECENTLY RECORDED.

—*Amphidasys prodromaria*.—M. F. Delahaye chronicles two vars. of

A. prodromaria, male and female. The male has the ground of the primaries of a dark greenish colour, which is most apparent in the space between the two brown bands. These, on account of their blunted angles, are considerably wider than in the type towards the lower border. The brown band which adjoins the terminal border is very dark, almost black, and extends nearly up to the fringe. The other band at the base of the wing is similarly widened and coloured. The large black dot in the area between the bands is elongated in a fine line nearly to the internal border. The secondaries present a clouded appearance, darker than in the type, with the fringe more largely spotted with greyish black. The thorax is about three parts black mixed with greenish. The collar is encroached upon by the black, but the antennæ and abdomen do not show any peculiarity. The female is still more curious, and seems to defy exact description. If as in the case of the male the median space in the primaries is larger than ordinary, it does not present a uniform colour; for whereas the lower part is mixed with black, greenish, and russet-colour, the part which approaches the side is clearer, the green passes gradually into dark grey, while the large black dot is opened out into a V-shaped mark. The same effect is brought about in the space between the first band and the base of the wing, but in this area it is the black which prevails. Concerning the second or outer band, the black has encroached, becoming more and more dense, up to the fringe, and so completely that only two small white spots remain. The secondaries are still darker than those of the male. The antennæ and thorax are nearly black. The moth presents a fine velvety appearance where the black predominates. (*Le Naturaliste*, No. 196, p. 105.)

The following have been caught in the district of Vladimir, Russia:—

Epinephela ianira, ab. ♀ *illustris*, var. nov.—Above clear brownish grey with metallic lustre. The yellow patch of the primaries clearer than in the type. The secondaries with a muddy yellow central spot, as in var. *hispulla*, or without such.

Euchelia jacobææ, L., with yellow hind wings.

Angerona prunaria, ab. *sordida*, Füssly. — A gynandrous specimen has been caught in the government of Moscow.

Melitæa aurinia, Rott.—A gynandrous example of this species was taken in the district of Vladimir. (A. Jachontoff, *Societas Entomologica*, 1895.)

Callimorpha dominula.—At a meeting of the Entomological Society of Belgium, held Sept. 7th, 1895, M. Hippert recorded the capture of an aberration of *C. dominula* with orange spots, taken at Rochefort in June, 1895.—W. MANSBRIDGE.

GLOWWORMS IN OCTOBER.—Noticing Mr. Reid's observation upon this subject (*ante*, p. 24), I beg to state that the "females" he captured were in reality the larvæ. The imago beetle is only abroad during the summer months, and the records one periodically sees in the papers of "late glowworms" invariably refer to the larvæ of *Lampyris noctiluca*. I myself took larvæ of this species here within three days of Mr. Reid's observation. I have taken it from moss in mid-winter, and again late in March, after which time it soon assumes the pupa-state, the perfect insect generally appearing about the middle of July. These insects

should never be wantonly killed by the horticulturist, as they destroy an enormous quantity of snails, for cleaning itself from the slime of which the larva is furnished with a little brush at the apex of the abdomen. Another curious and not generally known fact is that this species is luminous throughout all its stages, both egg and pupa, as well as larva and perfect female, giving off their phosphorescent light; occasionally also a faint glimmer may be detected in the male. The female may easily be distinguished from the larva by its obvious antennæ and the absence of lateral yellow marks on each segment of its body.—CLAUDE MORLEY; Ipswich.

CAPTURES AND FIELD REPORTS.

HAWK-MOTHS IN EAST KENT IN 1895.—During the past year several of the hawk-moths have been very plentiful near Wye, in Kent. During June numbers of *Charocampa porcellus* could be taken along the foot of the North Downs near Wye, especially on the old racecourse. They were mostly seen at rest on bedstraw and on grass. I was unable, however, to find any larvæ at the end of the summer. Several *C. elpenor* were also taken along the banks of the Stour, on the large willow-herb, near Ashford, and one at Wye. In October two full-fed larvæ (both the dark type) of *Sphinx convolvuli* were brought me, found in some allotment gardens on potatoes. On examination of the ground I found, however, any amount of *convolvulus* growing amongst the tubers. Several others, the labourers told me, had been found, some quite green; whether these were the green form of *S. convolvuli* or *Acherontia atropos* larvæ I cannot say. *Smerinthus ocellatus* was very abundant, in the larval state, on osiers between here and Ashford, and *S. tilia* and *S. populi* plentiful generally in the district. *Sphinx ligustri* I have seen little of, only two larvæ having been observed, but I am told it is usually common in this neighbourhood.—FRED. V. THEOBALD; Wye Court, Kent, Jan. 1896.

VANESSA ANTIOPA AT EPSOM.—There have been so few records of the occurrence of this grand insect in England of late years that the following may prove interesting to the readers of the 'Entomologist.' A lady who lives in Epsom found, on Dec. 19th, a butterfly sitting on the ashes in the fireplace of one of her rooms. When she first saw it she mistook it for a cinder, and it seems most wonderful that the insect should have chosen a resting-place so very similar in colouring to the under-surface of its own wings. I saw the butterfly on Dec. 20th, and found it to be a Camberwell Beauty in fairly good condition. There can be little doubt that it entered the chimney in which it was possibly attempting to hibernate. The outer parts of the wings are of a whitish colour, then followed by a band of black containing blue spots, and inside this band to the body is a rich chocolate-brown.—EDMUND H. LANCASTER; White Cottage, Epsom.

EUPITHECIA ALBIPUNCTATA BRED IN DECEMBER.—Upon examining some of my breeding-cages, on Dec. 19th, I was surprised to find a fine freshly-emerged specimen of this moth. The cages are kept in an open shed facing the east, and there had been some sharp frosts on the 8th, 9th, and 10th of the month. In another cage was a dead *Hadena suasa* which

had come out during the autumn.—GERVASE F. MATHEW; Dovercourt, Jan. 13th, 1896.

EUGONIA ALNIARIA (ENNOMOS TILIARIA).—On Aug. 15th a friend of mine took a specimen of *Ennomos tiliaria*, and on the 19th of the same month I also captured another; they were both upon the gas-lamps near Leytonstone Station, and were in excellent condition. I believe this species to be very scarce in this locality, never having seen it here before.—G. R. GARLAND; Leyton, E., Dec. 19th.

HYBERNIA DEFOLIARIA ABUNDANT.—On Dec. 1st I paid a visit to Hawk Wood, Chingford, and I had not gone far before I came across *H. defoliaria* in endless profusion, both male and female, the dark variety (as illustrated by Newman) far exceeding the others in numbers. I may mention that I have bred what I believe to be a remarkable variety of this species this season, the ground-colour of the wings being orange-ochreous, with broad bands of a dark chocolate colour (almost black). On the above date I saw only two specimens of *H. aurantiaria*, while *Cheimatobia brumata* was fairly common.—G. R. GARLAND; Leyton, E., Dec. 19th.

XANTHIA OCELLARIS IN SUFFOLK.—On Dec. 7th I received a box of insects taken at light by Mr. A. B. Corder, of Ipswich, during the past autumn. Amongst them I was surprised to find a very perfect male of *X. ocellaris*, with the characteristic white dot under the reniform stigma showing up clearly: had it not been for this I should almost have taken it for a variety of *X. gilvago* with the usual smoky clouds absent. As there are now several records for Ipswich, it is much to be hoped that this interesting addition to our fauna may establish itself there permanently.—JAS. W. CORDER; 1, Ashbrooke Terrace, Sunderland, Dec. 30, 1895.

LEPIDOPTERA OF IRELAND.—As an addition to the list of localities for *Cirrhædia xerampelina*, given by Mr. W. F. de Vismes Kane in his Irish Catalogue (Entom. xxviii. 327), I may mention that in the last week in August I took two specimens at Glendalough, Co. Wicklow, which came to light at the hotel windows. I sugared for them on the ash, but did not find any more, though I took several specimens of *Xanthia fulvago* (*cerago*). The specimens of *Polyommatus phlæas* from this district were exceptionally large and bright.—DOUGLAS H. PEARSON; Chilwell, Notts, Dec. 3rd.

SPHINX CONVULVULI IN W. AFRICA.—While everyone is recording *S. convolvuli* at home, why not record its appearance further afield? I picked up a larva the other day feeding on convolvulus, and a fortnight after bred a specimen of *S. convolvuli*. This is the first I have seen, though an allied species [*S. pseudoconvolvuli*, Schaaf.—ED.], also a convolvulus-feeder, is common. This latter is darker, with two cream-coloured dots in the centre of the fore wings. All these hawk-moths are easily bred here, going through their transformations in a very short space of time. *Cherocampa neri* I have lately found here, but not commonly; probably, if I knew its habits, it would not be scarce.—GEO. A. HARKER; Gd. Bassam, Dec. 4th, 1895.

LOCUSTA PEREGRINA, OLIV., IN LONDON.—It may be of some interest to entomologists to know that on the 10th ult., near here, I picked up a fine example of the above species in a semi-dormant state. On setting this insect the following day I was rather surprised to notice how little the worse it was, considering the tempestuous weather it must have experienced. It measures $4\frac{1}{16}$ in. from wing to wing and $2\frac{1}{16}$ in. from the head

to the abdominal extremity: it has the characteristic markings, *i. e.* elytra light sepia, faintly mottled. I have never heard before of this exotic insect having been found singly in this country, but believe this is the first instance of its having been taken in London.—F. W. BELL-MARLEY Ravenscourt Park, Jan. 16th.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*December 4th, 1895.*—Professor Raphael Meldola, F.R.S., President, in the chair. Mr. S. H. Scudder, of Cambridge, Mass., U.S.A., was elected an Honorary Fellow to fill the vacancy caused by the death of Prof. C. V. Riley. Lieut.-Col. C. T. Bingham, of 4, Waverley Place, St. John's Wood, N.W.; Captain C. G. Nurse, of 5, St. Mary's Square, Bury St. Edmunds; and Mr. E. F. Studd, M.A., B.C.L., of Oxtou, Exeter, were elected Fellows of the Society. The Secretary read a copy of a letter of condolence which he had written, by the direction of the Council, to the Entomological Society of France on the death of their President, Mons. E. L. Ragonot; and he also read a letter in reply from the Secretary of the Entomological Society of France. Mr. R. Adkin exhibited a specimen of *Mesogona acetosella*, taken at Arlington, Sussex, in October, 1895. It was stated that this was the first recorded capture of this species in Britain. Mr. G. T. Porritt exhibited an example of *Halesus guttatipennis*, taken at Lye, Worcestershire, in November, 1889. It was believed to be the third British example. Mr. Porritt also exhibited a series of *Mania typica*, showing a curious malformation in all the specimens. He stated that about one-third of a large brood had emerged in exactly the same form, having the wings only half developed, but with the markings clearly defined. Mr. Tutt and Mr. McLachlan referred respectively to similar malformations in *Agrotis tritici* and *Hadena chenopodii*. Mr. Goss read a communication from Mr. Sidney Crompton, of Salamanca, Tenerife, announcing the capture there by Mr. Hammerton of two specimens of *Diadema misippus*, a species of butterfly not previously recorded from Tenerife. Mr. Crompton said the specimens were in such fine condition that they must have been introduced into Tenerife in the larval or pupal state and emerged there. Mr. Hampson, Prof. Meldola, and Mr. Osbert Salvin made some remarks on the distribution of the species. Mr. Champion read a paper entitled "On the Heteromorous Coleoptera of St. Vincent, Grenada, and the Grenadines." Mr. Kenneth J. Morton communicated a paper entitled "New or Little known Palæarctic Perlidæ."—H. Goss & W. W. FOWLER, *Hon. Secs.*

January 15th, 1896.—63rd Annual Meeting, the President in the chair. The following gentlemen were elected as Officers and Council for 1896:—President, Prof. R. Meldola, F.R.S.; Treasurer, Mr. Robert McLachlan, F.R.S.; Secretaries, Mr. Herbert Goss and the Rev. Canon Fowler, M.A.; Librarian, Mr. Geo. C. Champion; and as other Members of the Council, Mr. W. F. H. Blandford, M.A., Mr. G. F. Hampson, B.A., Prof. Edward B. Poulton, M.A., F.R.S., Mr. Osbert Salvin, M.A., F.R.S., Dr. D. Sharp, M.A., F.R.S., Mr. Roland Trimen, F.R.S., The Rt. Hon. Lord Walsingham, LL.D., F.R.S., and Col. J. W.

Yerbury, R.A. It was announced that the President would appoint Dr. D. Sharp, Mr. Roland Trimen, and Mr. W. F. H. Blandford, Vice-Presidents for the Session 1896-1897. Prof. Meldola then delivered an Address, in which he first drew attention to the remarkable literary activity of the entomologists of this country during the past year, referring particularly to the works recently published by Miall, Meyrick, Barrett, Rye, Lucas, and Buckton; and to the new volume of 'The Cambridge Natural History,' by Sedgwick, Sinclair, and Sharp. Attention was also called to the interesting discoveries in insect physiology by Latter and Hopkins. The main portion of the Address was devoted to a plea for a more liberal use in biological work of the theoretical or speculative method which had proved so fruitful in other branches, and which, in the President's opinion, might with advantage be more freely employed in connection with entomological investigation. Illustrations were taken from the work of Bates on mimicry, Wallace on the colour of insects, and Poulton's researches on variable colouring, all of which had been prompted by hypothesis, and which had led to discoveries of large bodies of facts which would never have been gleaned by haphazard observation. In conclusion, the President referred to the losses by death during 1895 of many Fellows of the Society and other entomologists, special mention being made of Prof. C. V. Riley, Prof. C. C. Babington, F.R.S., The Right Hon. T. H. Huxley, F.R.S., M. E. L. Ragonot, Major J. N. Still, Prof. Carl E. A. Gerstäcker, M.D., M. Claudius Rey, M. Jules F. Fallou, and Mr. W. H. Tugwell.—H. Goss, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—November 28th.—Mr. T. W. Hall, F.E.S., President, in the chair. Mr. Chipps, of Barnes, S.W., was elected a member. Mr. R. Adkin exhibited a specimen of *Mesogona acetosella*, Hb., a species new to Britain; it was taken on October 26th near Brighton. Mr. Adkin also exhibited a series of *Coremia munitata*, Hb., from Hoy, with series of the same species from Shetland and Paisley, and of *C. designata*, Hufn., for comparison, and read notes on the variations exhibited. Messrs. Barrett, Tutt, and Carrington remarked on the habit of the species of flying during the daytime in elevated, exposed, and alpine regions. Mr. H. Moore, a long series of *Ocneria dispar*, L., bred from a Bordeaux female; they were all small, owing to the larvæ being fed on hawthorn it was thought. Mr. Carrington, four xanthic specimens of *Epinephete ianira*, L., from Leigh, Essex, taken in the same field in 1890-91; also he showed typical and lemon-coloured forms of *Hesperia lineola*, L., from Shoeburyness. Mr. Clark, a number of large and well-executed Micro-photographs. Mr. Hy. J. Turner, a specimen of the moorland form of *Noctua festiva*, Fb., from Carlisle; *Crambus pinellus*, L., from Box Hill; a very rosy specimen of *Anticlea rubidata*, Fb., bred, from Chichester; and a pair of *Coccyx cosmophorana*, Tr., from Carlisle. A long discussion took place on the life-history of this latter species. Mr. McArthur had bred a number from the knobs produced by *Retinia resinella*, a year after they had emerged, and said that he found the larvæ in the trass of this species. It was not found at Rannoch, but had been recorded from several localities where *R. resinella* was not known to occur. Mr. Ashdown, a bred specimen of *Acronycta alni*, L., from Richmond; and a specimen of *Eumenes*

coarctata. Mr. Briggs, an Orthopteron, *Periplaneta australasiæ*, taken at Kew, and new to Britain.

December 12th, 1895.—The President in the chair. Mr. Searancke, of Mitcheldean, Gloucester, was elected a member. Mr. Barrett exhibited, on behalf of Mr. Brooks, of Rotherham, a long bred series of *Boarmia repandata*, L., including black forms, and forms having the dark markings intensified but not extended; a series of the grey form of *Tephrosia biundularia*, Bork., both from Rotherham; and a large number of specimens of Lepidoptera collected near Lake Tanganyika, from Nov. 1892 to Feb. 1893, including two recently-named species, viz. *Pseudospiris paidiformis*, Butl., and *Sapæa trimeni*, Butl. It was noted that several species exhibited also occurred in Natal. Mr. Carpenter, *Tæniocampa munda*, Esp., *T. gothica*, L., *T. stabilis*, View., *T. incerta*, Hufn., *T. pulverulenta*, Esp., *Pachnobia rubricosa*, Fb., and reddish *T. gracilis*, Fb., taken at sallow-bloom in his own garden at Streatham. Col. Partridge, a nearly pure white *Cucullia absynthii*, L., bred at Portland. Mr. Barrett, on behalf of Dr. Mason, a number of extreme varieties of Lepidoptera, including *Agrotis segetum*, Schiff., uniformly pale and destitute of markings, a unicolorous *A. corticea*, Hb., a dark suffused *Acronycta alni*, L., a unicolorous pale *Noctua augur*, Fb., extreme dark and light forms of *A. lucerneæ*, L., *A. simulans*, Hufn., *A. agathina*, Dup., and *Ptilophora plumigera*, Esp., a pair of *A. subgothica*, Haw., and a very large *Noctua subrosea*, St. Mr. Adkin, specimens of *Hydæcia micæa*, Esp., from W. Meath, similar in depth of colour to *H. petasitis*, Dbl., and also a small *Agrotis saucia*, Hb., having purplish grey primaries and black-outlined stigmata. Mr. Tunaley, a var. of *Lycæna corydon*, Fb., with a wide black border, and another with the black border absent, both from Freshwater; specimens of *Asilus crabroniformis*, L., with *L. icarus* impaled on their lancets; and a series of *L. corydon*, Fb., remarkable for the tendency to angularity in the hind wings, taken at Freshwater; also specimens of *L. bellargus*, Rott., and *L. icarus*, Rott., showing the same tendency, and contributed notes on the peculiarity. Mr. South, specimens of *Adipocere* of the horse and moth, received from Dr. Kuaggs, and read the results of the latter gentleman's experiments. Mr. Winkley, on behalf of Mr. Montgomery, a large number of bred *Colias edusa*, Fb., and communicated a paper on the exhibit.

January 9th, 1896.—The President in the chair. Mr. F. Clarke, A.P.S., of Paddington, was elected a member. Mr. Carpenter exhibited a long series of *Colias edusa*, Fb., being a third brood, and bred from ova deposited by a female captured in August, 1895. The last emerged during the third week in November. Mr. Mansbridge, a series of *Hybernia marginaria*, Bork., consisting of the typical London forms, and a long series of melanic and variegated forms from York. A long discussion took place on the occurrence of these melanic forms. Remarks were also made on the various forms of *Gnophos obscurata*, Hb., and it was noted that it invariably assimilated to the colour of its local environment. Mr. Adkin, specimens of very strongly-marked forms of *Hybernia defoliaria*, Clerk., from Sussex. Mr. Mera, a series of *Agriopis aprilina*, L., from Elgin and Sussex. The northern forms possessed very complete bands. Mr. Edwards, *Papilio cenea*, Stoll., and the three forms of its female, viz. *P. cenea*, Stoll., *P. hippocoon*,

Fb., and *P. trophonius*, Westw., with intermediate forms; the three species of Danaidæ mimicked by the above, viz. *Amauris echeria*, Stoll., *A. dominicanus*, Trim., and *Danaïs chrysippus*, L.; the closely-allied species *P. meriones*, male, from Madagascar, and *P. merope*, Doub., male and female, from W. Africa, with *Amauris mavius*, which the latter mimicked; and also *Diadema misippus*, L., and *D. anthedon*, Bdv., which mimics *D. chrysippus* and *A. dominicanus* respectively. Mr. Hy. J. Turner read a paper on the above exhibit, entitled "Mimicry as exemplified by the S. African butterfly *Papilio cenea*, Stoll., its varieties and allied species."—HY. J. TURNER, *Hon. Report Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—November 19th, 1895.—Mr. P. W. Abbott, V.-P., in the chair. The chairman appealed to the members for material, specimens, &c., for a local collection it was proposed to make in connection with the Society, and for which a cabinet had been given by Mr. G. H. Kenrick. He asked chiefly for local species, of which good series were wanted, and asked for them to be carefully labelled. Exhibits:—By Mr. R. C. Bradley, sea-shore Muscidæ: *Actora æstivum* (Barmouth), *Orygma luctuosum* (Barmouth), *Cœlopa eximia* (Nevin, and of Portland), and *C. pilipes* (Barmouth). He called attention to the flat shape of the *Cœlopa*, and remarked that they lived among the stones, and dodged under them when an attempt was made to capture them. By Mr. P. W. Abbott, a pair of *Sphinx pinastri* from Sussex, where he said it had been taken in some numbers recently. By Mr. A. H. Martineau, *Sphinx convolvuli* from Solihull. By Mr. W. Harrison, a series of *Erebia blandina* from Witherslack Moss, and *Macroglossa fuciformis* from New Forest; also larvæ of *Liparis auriflua*, in the small white cocoons in which they undergo hibernation, found under the bark of a willow at Hanbury Park. By Mr. J. W. Smallwood, a number of Lepidoptera taken in S. Derbyshire, including *Acronycta alni*, *Cosmia affinis*, *Cirrhædia xerampelina*, *Eupithecia valerianata*, *Anticlea rubidata*, and *Trichiura crategi*. By Mr. C. J. Wainwright, *Asteroscopus sphinx* from Hanbury Park, and a fine dark specimen of *Hibernia defoliaria* from the same place, with an olive shade on its wings. By Mr. R. W. FitzGerald, a number of insects collected by him at Dursley near Gloucester, on the south-west slopes of the Cotswolds; they included *Xanthia aurago* (common, but worn when taken), *Xylocampa lithoriza* (a series on sugar), a long and varied series of *Scopelosoma satellitia*, *Orthosia macilenta*; *Himera penaria* (one from a dug pupa), a specimen of *Camptogramma bilineata*, the black markings of which had increased so as to form a well-marked black band on each wing. By Mr. Wainwright, a list of captures made by Mr. C. A. E. Rodgers at Malvern Wells, and remarked upon a resemblance between that insect fauna and that of Dursley on the opposite side of the Severn Valley, amongst other insects taken on both sides being *Procris geryon*, *Xanthia aurago*, *Orthosia macilenta*, &c.; both Mr. Rodgers and Mr. FitzGerald took *O. macilenta* commonly on the hills, and no *O. lota*; while Mr. Rodgers said that on the plains below Malvern the Rev. E. C. Dobrée Fox found *O. lota* plentiful, and no *macilenta*. Mr. R. W. FitzGerald knew, however, of larva of *O. lota* having been taken on the hills.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

READING NATURAL HISTORY SOCIETY.—A meeting, the first of the winter session, was held on November 7th, 1895. Mr. Hamm exhi-

bited several varieties of British species of Lepidoptera, among which were some exceedingly dark specimens of *Melitæa aurinia*, and one diaphanous example; aberrations of *Lithosia lutarella*, *Thyatira batis*, *Apamea unanimis*; also series of *Sesia sphegiformis*, *Xanthia aurago* (variable), *X. gilvago*, *Dasycampa rubiginea*, *Calymnia pyralina*, *Psyche opacella*, and other species. Mr. W. E. Butler exhibited, among others, varieties of *Smerinthus tiliæ*, *Xanthia gilvago*, *X. aurago*, and a very fine aberration of *Mamestra brassicæ*. Mr. Clarke exhibited a long series of *Zygæna trifolii*, graduated from the typical form to var. *confluens*; a series of *Stauropus fagi*, including black and banded forms; and other interesting species.—FRED. W. LESLIE, *Hon. Sec.*

NONPAREIL ENTOMOLOGICAL SOCIETY.—Meetings of the above Society were held on October 17th and November 7th. On October 17th, Mr. Jackson (President) exhibited some fine specimens of *Larentia berberata*, *L. flavicincta*, *Hydræcia nictitans*, *Heliothis dipsaceus*, *Xanthia fulvago*, *Triphæna orbona*, *T. subsequa*, and many other species. Mr. Norman exhibited bred specimens of *Bombyx callunæ*, *Papilio machaon*, *P. podalirius*, *Sphinx pinastri*, *S. ligustri*, &c.; also living larvæ of *Uropteryx sambucata* and *Odonestis potatoria*, and eggs of a third brood of *Arctia caia*. The Hon. Sec. exhibited some specimens of *Arctia caia*, which emerged during the second week of September; also some specimens of *Acidalia incanaria* and *Anarta myrtilli*, taken from Hinchlesden during July this year. They appeared to be much larger than the usual form taken near London. Mr. A. Norman showed living examples of *Swammerdamia pyrella*, the pupæ of which were exhibited a few weeks since. He also mentioned that he had a third brood of larvæ of *Arctia caia* feeding.—J. G. CRAFT, *Assist. Sec.*

RECENT LITERATURE.

The Cambridge Natural History. Vol. V. Insecta, Pt. I. By DAVID SHARP, M.A., M.B., F.R.S., &c. Pp. 83-584. 8vo. Macmillan & Co., London & New York. 1895.

THE volume contains a monograph of the genus *Peripatus*, by Adam Sedgwick, M.A., F.R.S., and one on Myriapods, by F. G. Sinclair, M.A., as well as Dr. Sharp's Insecta; but only the latter falls within our province.

In the introduction to his subject, Dr. Sharp gives a comprehensive sketch of the external and internal structure of insects, also of their embryology and metamorphosis, attaching primary importance to the physiological processes of the latter; the external features he regards as being of lesser value. In fact, our author seems throughout to insist that those who wish to understand insect-life scientifically must study their subject from a physiological point of view.

The number of orders recognised are nine. These are—1, Aptera; 2, Orthoptera; 3, Neuroptera; 4, Hymenoptera; 5, Coleoptera; 6, Lepidoptera; 7, Diptera; 8, Thysanoptera; 9, Hemiptera; but only the first four are considered in the present volume. The remainder

will form material for a second volume. The arrangement will perhaps be set down as somewhat antiquated by those who accept at once any new scheme that may be presented to them, but our author holds the opinion that the attempts that have been made to increase the number of orders are inadequate, and do not really deal equally with the whole subject. Thysanura and Collembola are treated as suborders of Aptera, but at the same time it is admitted that Collembola has not so far been exhaustively worked out, and that "it is possible that more grounds will be found for separating them as a distinct order from the Thysanura—a course that was advocated by Lubbock—than exists for dividing these latter from Orthoptera proper." Aptera are regarded rather as primitive or little evolved forms than as degenerate insects, and as to their being ancient or ancestral, our author thinks that the reasons put forth for considering them as such are insufficient. The general likeness of Campodea to certain young insects of various kinds is "no more proof of actual ancestry to them than their resemblances *inter se* are proofs of ancestry to one another."

In the chapter on Orthoptera we note, among other important details, some interesting remarks on the recent discoveries about Phyllium (leaf-insects); reference is also made to the term "hypertely," proposed by Brunner to express the idea that mimetic resemblance of the design on wing-covers, as, for example, the imitation of leaf-spots and veinings on the wing-covers of *Pterochroza ocellata*, is more elaborate than mere purposes of utility require.

Chapter XVI. is devoted to a lengthy consideration of the Neuropterous family Termitidæ, and comprises a great deal of information concerning these marvellous insects that will be new to entomologists.

The observations on May-flies are of an exceedingly instructive character, and it is shown how external and internal structures and habits in the various stages of these insects are all correlated.

In the division Hymenoptera only points of general interest and the parasitic groups are dealt with in the present volume; the Aculeata will be considered in the next volume. The phenomena, however, connected with parthenogenesis and production of sex are reviewed, exception being taken to some of the conclusions founded on Dziergon's observations. As regards polymorphism, or castes, in the social Hymenoptera, our author is inclined to accept Herbert Spencer's view that "the sex is determined by degree of nutrition while the egg is being formed," and that the subsequent production of a perfect or imperfect female is dependent upon the nutrition of the larva. The curiously varied conditions of the early life of parasitic Hymenoptera is shown to be accompanied by equally remarkable embryological peculiarities.

We regret that space is not available for a more extended notice of this excellent work, but we can earnestly commend it. It is capitally illustrated, most of the figures being from original drawings; and all the information is thoroughly up to date. There is a growing desire among those who are interested in insects to acquire a general knowledge of orders they do not specially study; this work is the very thing for their purpose.

INSECTS and other NATURAL HISTORY SPECIMENS.

MR. J. C. STEVENS will SELL BY AUCTION, at his Great Rooms, 38, King Street, Covent Garden, on Monday, February 17th, at half-past 12 precisely, the Collection of **BRITISH LEPIDOPTERA** formed by Mr. P. Russ, of Sligo, containing many good Species and Local forms, taken or bred by himself in Ireland; also British and Exotic Insects, and other Natural History Specimens, &c.; Cabinets.

On view Saturday prior 12 till 4 and morning of Sale, and Catalogues had.

MONDAY and TUESDAY, MARCH 9th and 10th.

A VALUABLE COLLECTION of BRITISH LEPIDOPTERA.

MR. J. C. STEVENS will SELL BY AUCTION, at his Great Rooms, 38, King Street, Covent Garden, on Monday and Tuesday, March 9th and 10th, at half-past 12 precisely, a very **VALUABLE** and **EXTENSIVE COLLECTION** of **BRITISH LEPIDOPTERA**, the result of many years' work and careful selecting. The Collection is very

RICH IN RARE SPECIES

of *Rhopalocera*, *Noctuæ*, *Geometræ*, *Pyrallides*, and *Tortrices*; the *Polyommatus dispar* are the pick of the STANDISH COLLECTION, and are without doubt the finest offered for sale for many years. The rarer *SPHINGES* are well represented; and the *SESIDÆ* include the rare *Allanti-formis* and *Asiliformis*. The *original N. Lapponaria*, *L. Cænosa*, *Musculosa*, *Vitellina*, *Albipuncta*, *Ambigua*, *Exulis*, *Satura*, &c.; some grand *O. Lunaris* and *Fraxini*; and the very fine *Catocala electa* taken by Mr. VINE, 1875, Standish Collection of *Tortrices*, are intact in a 12-drawer Cabinet, and contains many rare Species in the finest possible condition. Boxes of **Local Forms** from Shetland, Lewes, Orkney, Arran, Ireland, and elsewhere. Cabinets of 12, 20, and 52 drawers; Books, &c.

On view Saturday prior 12 till 4 and mornings of Sale, and Catalogues had.

MEETINGS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—Wednesday, February 5th, at 8 p.m. Papers to be read:—(1) "On the Relation of Mimetic Patterns to the Original Form." By Dr. F. A. Dixey, M.A., F.E.S. (2) "The Rhynchophorous Coleoptera of Japan." Part IV. By Dr. D. Sharp, M.A., F.R.S. (3) "The Diptera of St. Vincent." By Prof. Williston; communicated by Dr. D. Sharp, M.A., F.R.S. Wednesday, February 19th, at 8 p.m. Papers to be read:—(1) "Notes on Flower-haunting Diptera." By G. F. Scott-Elliot, M.A., B.Sc., F.L.S.; communicated by H. Goss, F.L.S. (2) "On the Nomenclature of the Geometridæ." By A. Radcliffe-Grote, M.A.; communicated by J. W. Tutt, F.E.S.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.—Meetings on the 2nd and 4th Thursdays in each month, at 8 p.m. February 13th: Mr. South will read a paper, "Remarks on the genus *Argynnis*, with particular reference to a certain phase of Variation." February 27th: Mr. Billups will read a paper on "Hymenoptera." March 12th: Mr. Barrett will commence a discussion on "The genus *Dianthecia*." March 26th: Mr. Enoch will give a lecture on the "Life-history of *Cicindela campestris*," illustrated by the lantern.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—The meetings of this Society (held at the London Institution, Finsbury Circus, E.C.) will take place on the 1st and 3rd *Tuesdays* in each month, from 7.30 to 10 p.m. as heretofore.

NORTH LONDON NATURAL HISTORY SOCIETY.—Meetings are held on the 2nd and 4th Thursdays in each month at the North East London Institute, Dalston Lane (close to Hackney Downs Station on the G.E.R.), from 7.45 to 9.30 or 10 p.m.

Marked * are bred.

Gratuitous distribution.—Exotic butterflies, types, &c. Send reply-card.—*W. Dannatt; Ivy Dene, Westcombe Park, S.E.*

Desiderata.—Corked store-boxes. Offered, a large number of entomological books and magazines, including back volumes of 'Entomologist,' 'Entomologist's Annual,' 'Science Gossip,' &c.—*W. Harcourt-Bath; Ladywood, Birmingham.*

Duplicates.—Lidderdallii (1). Bootes (2). Offered for either *O. cressus* (male), *M. godartii*, or *A. phalacidon*.—*W. J. Kaye; 41, New Walk, Leicester.*

Duplicates.—Larvæ of Ligniperda. *Desiderata.*—Very numerous.—*E. A. Brackenbury; Cranleigh School, Guildford.*

Duplicates.—Cassiope, Betularia (black), ova of Aurantiaria and Boreata. *Desiderata.*—*H. Comma* and *Actæon* only.—*Rev. C. D. Ash; Skipwith Vicarage, Selby.*

Duplicates.—North American Heterocera:—*Papilio ajax*, *P. philenor*, *P. asterias*, *Pieris protodice*, *Euptoieta claudia*, *Phyciodes tharos* and var. *morpheus*, *P. nycteis*, *Apatura celtis*, *Anceia andria*, *Danaïs archippus*, *Pyrameis huntera*, *Vanessa atalanta*, and others. Low set on black pins. *Desiderata.*—*Pierinæ* from any part of the world.—*Wm. Mansbridge; 9, The Green, Stratford, E.*

Duplicates.—British:—*Paphia*, *Aglaia*, *Adippe*, *Sinapis*, *Galatea*, *Hyale*, *Sibylla*, *Zonaria*, *Pinetaria*, *Nebulosa*, *Lineolata*, *Batis*, *Dispar*, *Minutata*. European:—*Athalia*, *Cinxia*, *Selene*, *Apollo*, *Delius*, *Phicomene*, *Ligea*, *Aurita*, *Carnatica*, *Hera*, *Lisomina*. Exotic:—*Atlas*, *P. Hector*, *Agamemnon*, *Sarpedon*, *Paris*, *Memnon*, *Antiphates*, *Cassinœ*. *M. Erymanthes*, *D. Lotis*, *Septentrionale*, *Gobrias*, *Limniacæ*, *Cadoliæ*, *Polixena*, *Athamas*, *C. Thyodamas*. *E. Linæi*, *Lowii*, *Cramerii*, *K. Inacleis*, *H. Linceus*, *T. Hecabe*, &c.—*Rev. M. Hick; Trimdon Grange, R.S.O.*

Duplicates.—Literana and vars., *Hartiana* and vars., *Variegana* and vars., *Comptana*, *Perplexana*, *Comariana*, *Cinerana*, *Ophthalmicana*, *Rubiginosana*, *Pilleriana*, *Pinicolana*, *Buoliana*, *Pinivorana*, *Internana*, *Splendidulana*, *Palleana*. *Desiderata.*—*Cratægana*, *Prodromana*, *Lipsiana*, *Dimidiana*, *Portremana*, *Pauperana*, *Simplana*, *Latifasciana*, *Palifrontana*, *Abrasana*, *Pascuana*, *Sinuana*, *Penziana*, *Siculana*, *Obtusana*, *Grandævana*, *Signatana*, *Nigricana*, *Scopariana*, *Pygmæana*, *Distinctana*, *Orbana*, *Ravulana*, *Erectana*, *Trauniana*, *Nimbana*, *Expallidana*, *Populana*, *Paludana*, *Tetragonana*.—*Richard South; 101, Ritherdon Road, Upper Tooting, S.W.*

Duplicates.—*P. Brassicæ*,* *Rapæ*,* *Cardamines*, *Hyperanthus*, *Megæra*, *Egeria*, *Atalanta*,* *Io*,* *Urticæ*,* *Sinapis*, *Paphia*, *Argiolus*, *Alexis*, *Gemina*, *Suasa*, *Jacobææ*, *Exclamationis*, *Cruda*, *Gothica*, *Antiqua*, *Stabilis*, *Instabilis*, *Pronuba* (vars.), *Impura*, *Nebulosa*, *Caia*, *Festiva*, *Mi*, *Prunaria*, *Advenaria*, *Lactearia*, *Elutata*, *Crepuscularia*, *Montanata*, *Atomaria*, *Bilineata*, *Cratægata*. English:—*Rhamni*, *Edusa*, *Galatea*, *C-Album*, *Euphrosyne*, *Corydon*, *Adonis*, *Agestis*, *Dispar*, *Litura*, *Flavago*. *Desiderata.*—Numerous.—*Rev. William W. Fleming; Coolfin, Portlao, Co. Waterford.*

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Many communications are unavoidably postponed until March.

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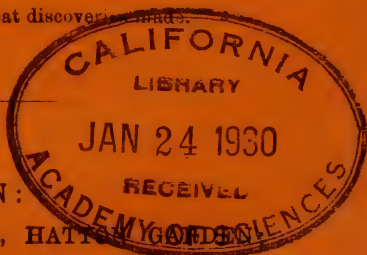
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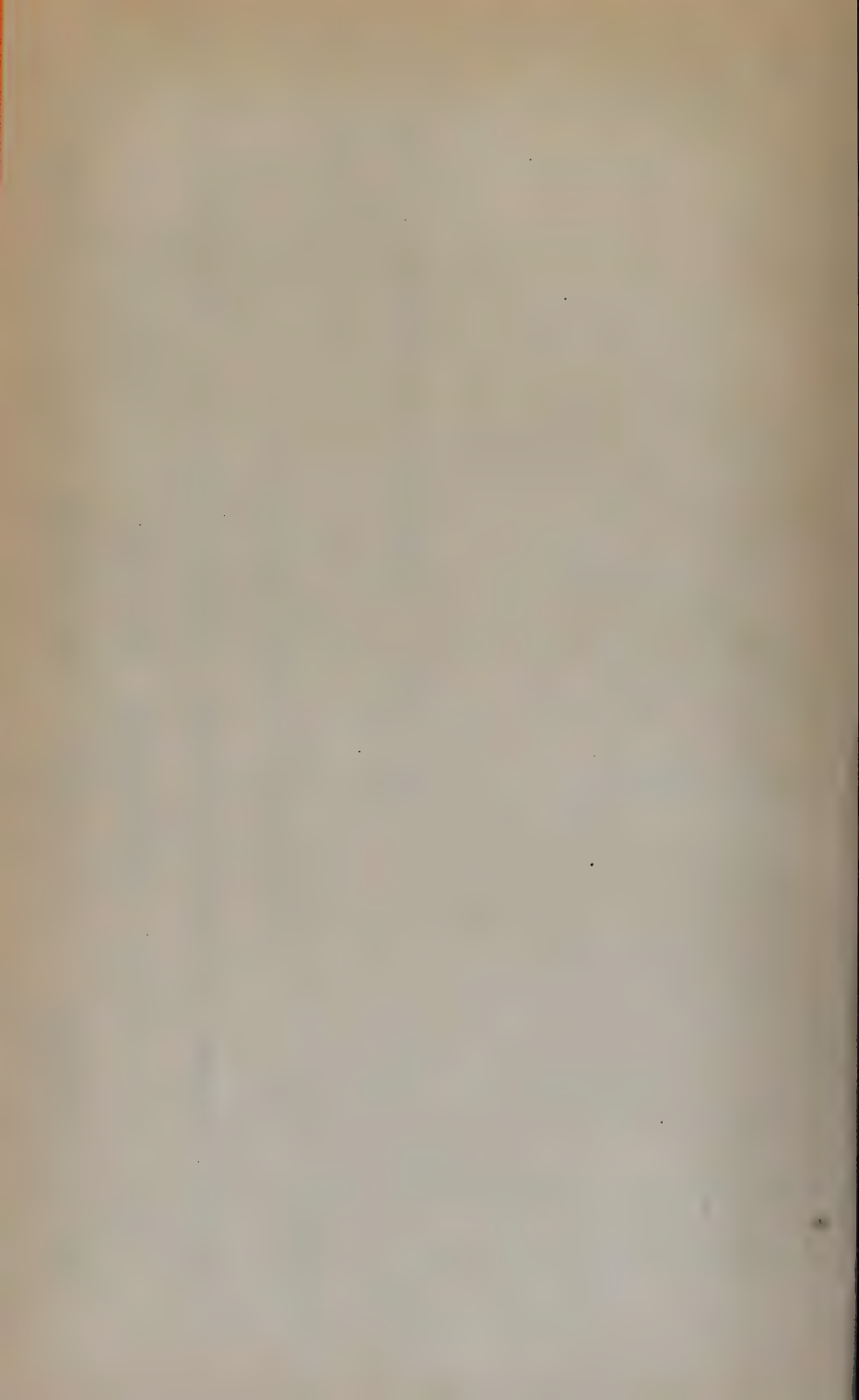
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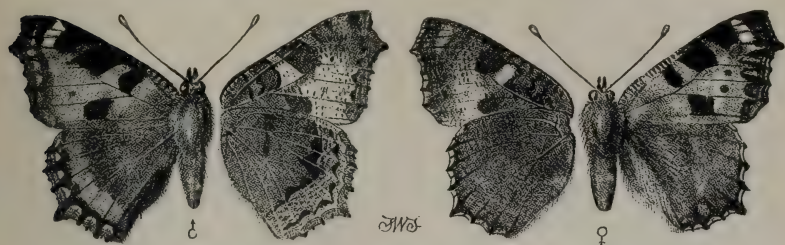
THE ENTOMOLOGIST

VOL. XXIX.]

MARCH, 1896.

[No. 394.]

VARIETIES OF *VANESSA URTICÆ*.



THE fine aberrations of *V. urticæ* represented by the above figures have been kindly lent to me by Mr. Bright, expressly for figuring in the 'Entomologist.'

In both specimens the primaries bear a close resemblance, both having the second and third black costal blotches almost confluent, the hind-marginal area blurred, and the usual blue markings diminished and greyed; the usual yellow marking separating the first and second costal blotches is replaced by the tawny-orange ground colour in the male; the same marking in the female is also deeper than usual; the male has but one small discal spot. The secondaries in this specimen have a suffusion of dark scales obliterating the usual yellow costal blotch, giving the wings a dullened appearance; the secondaries of the female are wholly blackish, with the merest indication of an orange band, by having that portion of the wing very slightly paler. The blue markings of normal specimens are in this aberration only represented by a single patch of bluish scales at the anal angle. The under surface of both specimens varies much in accordance with the upper surfaces, as will be seen by the figures.

Mr. Bright informs me that the specimens were obtained from the neighbourhood of Darlington.

F. W. FROHAWK.

NEW EXPERIMENTS ON THE SEASONAL DIMORPHISM OF LEPIDOPTERA.

By DR. AUGUST WEISMANN.

(Translated from the German by W. E. NICHOLSON, F.E.S.)

(Continued from p. 39.)

E. Details of the Markings of *phlœas*, independent of Climate.

1. *The blue spots.* — It has long been known, that many specimens of *phlœas* have bright blue spots on the outer margin of the upper side of the hind wings with the females, indeed, as well as with the males. As many as four can be present, but often one or the other of the spots is only indicated by some scattered blue scales, frequently only by a single one, and not infrequently no trace of the spots is to be seen at all.

Now, if specimens from the south are compared with those from the north, it turns out that well-developed spots occur in individuals everywhere, that indications of them are frequent everywhere, but that no correspondence exists between the climate and the degree of perfection of the blue spots. Some cases are here given by way of illustration.

A. The following specimens in my collection exhibit 3-5 well-developed blue spots:—

- 1 specimen from Lapland.
- 1 " " Sardinia, spring brood.
- 1 " " Corsica, summer brood.
- 1 " " Lindau, summer brood.
- 3 specimens " Japan, summer brood.
- 8 " " Japan, spring brood.
- 2 " " Naples, reared at Freiburg at a
 room temperature.
- 3 " " of pupæ developed at 7-10° C.

B. Slight indications of the spots, *i.e.* they exhibit blue scales in lesser number and more or less scattered:—

- 1 specimen from Lapland.
- 3 specimens " Sardinia, spring brood.
- 10 " " Genoa, summer brood.
- 3 " " Greece, summer brood.
- 2 " " Berlin.
- 4 " " Lindau.
- 12 " " Leipzig, pupæ at 27-31° C.
- 28 " " Japan, summer brood.
- 14 " " Japan, spring brood.
- 14 " " Naples, reared at Naples, summer brood.
- 23 " " Naples, reared at Freiburg at room
 temperature.
- 6 " " Naples, pupæ developed at 7-10° C.

The largest and most beautiful blue spots are possessed by some Japanese specimens of the summer and spring broods, 1 Sardinian, and 1 Lapland specimen.

C. Without a trace of blue were :—

1 specimen	from	Genoa (<i>eleus</i>).
1	„	„ Greece (<i>eleus</i>).
3 specimens	„	Lindau, summer brood.
8	„	„ Leipzig, kept at 24–30° C.
7	„	„ Japan, spring brood.

The blue spots are consequently individual variations, which are formed everywhere and under the most varied temperatures; they often appear only slightly, and still more frequently only suggestively, as single blue scales. It is questionable how they are to be explained; possibly, as vestiges of an early marking, which is in the course of disappearing; possibly, also as a new character asserting itself.

2. *The red band on the under side of the hind wing.*—There are on the grey-brown ground colour of the under side of the hind wing of all specimens of *phlœas*, so far as I have seen; brick-red lines along the outer margin, which are referred to in the books as “confluent reddish lunules.” They are also in reality very often distinct as separate “lunules” in cells 1–5, but they are frequently also joined together in a line running in an almost zigzag shape, from which the red spreads inwards to a narrow washed-out band. This red marking varies, but, as it seems, independently of temperature; it is rather local, in such a way, that the individuals of a particular district all present an almost equal development of the same. Thus all my Japanese specimens of the summer brood, 72 specimens, have a broad and vivid brick-red coloured band, in opposition to the specimens of all other countries, with which I can compare. Felder founded, indeed, his *Polyommatus chinensis* on this peculiarity. I have not found this band again in any other colony of the species. Specimens from North Germany always have only a narrow red line or disconnected marginal lunules, which are sometimes strongly, sometimes slightly, brick-red; the Lapland specimens also have these lines very distinct, just as the South German and Berlin specimens, and also most specimens of *eleus* from Greece, Corsica, and Genoa. Sometimes, indeed, the red is very dull; yet I have never entirely missed it. The lunules, which are the feeblest in colour and the most washed-out in marking, are those of my Neapolitan specimens, which were subjected to cold as pupæ, and so far consequently the formation of this character depends upon the temperature, although the washed-out appearance of these lunules is a result of the great humidity in the refrigerator. The marking was washed out in many butterflies

in the refrigerator, not merely in *phlœas*, but also in *Vanessa urticae* and *levana*, and other pupæ, which had been long in the refrigerator, all frequently produced butterflies with washed-out markings.

3. *The tails of the hind wings.* — A short tail on nervure 2 of the hind wing and a pointed prolongation of the anal angle is given as a character of *eleus*, yet it is not confined to this form, but is also occasionally present in the pure red-gold form, although more rarely. Three grades of the formation of tails can be arranged as well developed, medium, and slight, which occur in my specimens in the following division :—

1. *Captured specimens.*

1. The following specimens had well-developed tails :—

From Lindau, 1 specimen.

„ Freiburg, 1 specimen.

„ Berlin, 1 specimen (*eleus*).

„ Sardinia, 1st brood, 1 specimen.

„ Genoa, 2nd brood, 11 specimens (mostly *eleus*).

„ Greece, 2 specimens (*eleus*).

„ Sicily, 1 specimen (*eleus*).

„ Japan; summer brood ; many (accurate figures cannot be given on account of the worn condition of many specimens).

2. The following had medium tails :—

From Lindau, 1 specimen.

„ Freiburg, 1 specimen.

„ Sardinia, 1 specimen, 1st brood.

„ Greece, 1 specimen (*eleus*, ♀).

„ Japan, many of the 2nd brood.

„ Japan, some of the 1st brood.

3. Slight significance of the tail ; the following had, respectively, no tail :—

From Lapland, 2 specimens.

„ Sardinia, 2 specimens of the 1st brood.

„ Japan, many specimens of the 1st brood.

One certainly recognizes from these data, that in fact the tail is more often present in the summer brood and in a hot climate, than in the spring brood and in a northern climate ; but the experiments above related give a still more decisive conclusion.

2. *Bred specimens.*

1. The Neapolitan specimens reared at Naples exhibited the character in 30 cases well developed, twice to a medium extent, and in no case slightly.

2. The Neapolitan larvæ reared at Freiburg at a room temperature produced 8 well-developed, 13 medium to slight.

3. The Neapolitan pupæ developed at Freiburg in the refrigerator produced 15 specimens with medium to slight tails, and 11 specimens with them entirely wanting.

Consequently the impression of this character appears to be connected with the warmth, which is operating during the pupal development, as it increases in direct proportion with the warmth.

II. EXPERIMENTS WITH *PIERIS NAPI*, 1887.

Five females, taken in the neighbourhood of Freiburg (at St. Peter), laid a number of eggs on *Sisymbrium alliaria*, under a gauze bag, on June 8th, 1887. The emergence of the larvæ followed at 21–22° C. on June 14th, and the larvæ, which fed on *Sisymbrium*, pupated at 21–22·5° C. in a room between June 30th and July 2nd. The pupæ were divided into two lots.

First experiment with napi.—The pupæ at first remained in a room at the summer temperature, 22–25° C., at which the emergence should have followed after 9 days, as was ascertained by experiment with one pupa. In order now to decide, whether the alteration of the summer form into the winter form would still take place, if cold first occurred in the last days of the pupal period, consequently at the time of the formation of colour, 45 pupæ were brought into the refrigerator on July 7th, *i.e.* 6–8 days following pupation. Development was now delayed by the lower temperature, 7–11° C.; but of the 35 butterflies, which emerged between July 13th and 22nd in the refrigerator, 26 were of the pronounced summer form; only 10 exhibited stronger green powdering of the veins below,* yet without possessing the rest of the characters of the winter form, with the exception of the deep black powdering of the bases of the wings on the upper side, which occurred among all the males (6); while the shape of the wings, their larger size, and the white powdering of the abdomen distinguished them as the summer form. Moreover the specimen, which pupated in the room and developed at 22–25° C., possessed an entirely similar mixture of characters.

On July 24th the pupæ which had not yet emerged were brought into the incubator at 29·2° C.; however, only 3 more butterflies of the summer form emerged on the 25th; the rest *first emerged in the following year*. They were hybernated in the cellar, and placed in a room in April. Then 12 more butterflies emerged between April 29th and June 2nd, all of an *exquisite winter form*; all smaller than the specimens of the *same brood*, which had emerged in the year 1887.

* There was a specimen very similar to this, whose pupa had developed at 25° C.

Second experiment with napi.—A number of the pupæ were placed in the refrigerator at approximately $+9^{\circ}$ C. *immediately after pupation.*

A. Four of the same, placed in on June 28th, remained there from June 29th to July 23rd, generally at 9° C.; the temperature, however, fluctuated between 7 and 11° C., but only rarely reached either extreme. None of these pupæ emerged in the refrigerator, although they remained there 24–25 days; and the longest pupal period of the pupæ of lot A, kept in the same refrigerator, amounted to 26 days, the least 11 days, and with the majority less than 20 days. All 4 pupæ were still, on July 23rd, of a beautiful green, as immediately after pupation, *i. e.* the colours of the butterfly were not yet formed. After they had first been brought for some hours into a room at 22° C., and into the incubator at 30 – 31° C., they developed rapidly, and emerged after 3 days (on July 26th and 27th), all four as *not very sharply defined winter forms* (the powdering of the veins of the under side of the hind wings feebler than usual).

B. Twelve recently-formed pupæ and 2 larvæ, spun up ready for pupation, were placed in the refrigerator on July 2nd, at an average of $+9^{\circ}$ C. These also remained unchanged in appearance, partly green, partly straw-yellow, up to July 20th. On Aug. 18th a male emerged as a *decided winter form*; all the rest of the pupæ hybernated in a cold room, and emerged in the spring of 1888, *all as pronounced winter forms*, viz. :—

2 males on April 3rd.
 1 male on April 22nd.
 1 male on May 10th.
 1 female on May 20th.
 1 female on May 23rd.
 1 female on May 27th.
 2 females on June 2nd.
 1 female on June 7th.
 1 female on June 26th.

11 butterflies.

Results of the experiments with Pieris napi.—The first experiment shows, in the first place, that low temperature no longer brings about the transformation into the winter form, if the pupæ are first subjected to it a short time before their emergence. But it proves further, what was already known for other seasonally-dimorphic species, through many observers, Edwards, Merrifield, myself, and others, that there are individuals which cannot be forced by heat. A small portion of the pupæ (12 specimens) did not respond to the heat of the incubator, but hybernated, and then produced the winter form.

The second experiment proves once more, that the decision as

to whether the butterfly assumes the summer or the winter form, with this species, at least, is determined by the temperature, which influences it *immediately after pupation*. All the pupæ of this lot produced the winter form not so sharply defined, when, after 25 days' cooling in the refrigerator, they were then forced in the incubator, as when they remained until the autumn in the lower temperature and then hybernated in the cold.

Experiments with *Pieris napi* var. *bryoniæ*.

First experiment with bryoniæ.—The excellent entomologist, Pastor Hauri, at Davos, in Les Grisons, had the goodness to send me by post, at Freiburg i. Br., a number of captured females of *bryoniæ*.* Several arrived still alive on June 27th, 1887, and were placed under a gauze net on a flowering plant of rape, on which they soon laid numerous eggs. These developed rapidly at 26° C. in the room, and the young larvæ, which were not to be distinguished from ordinary *napi*, fed greedily on rape, and later on on ordinary cabbage. Pupation took place between July 16th and 25th.

As is well known, only one brood of *bryoniæ* flies in the Alps, and it was first to be ascertained, whether in any way the temperature of the lowlands would develop some of the butterflies. Although great heat prevailed during the whole of July and August, and the temperature of the room was generally over 20° C., yet none of the 24 pupæ emerged that summer. They were all hybernated in a cold room, and produced 24 butterflies in the spring of 1888, between April 26th and June 7th, 12 males and 12 females, all completely normal *bryoniæ*.

Second experiment with bryoniæ.—On July 17th, 25 individuals of the same brood as the first experiment, some shortly before, others shortly after, their pupation, were brought into the incubator, the temperature of which fluctuated about 29° C., and never rose above 31·6° C. A male emerged as early as July 17th, coming from the pupæ first brought into the incubator, consequently after only 7 days' rest as a pupa. This butterfly bore the characters of the summer form of *napi*; the green powdering of the veins on the under side of the hind wings is very slight, and so is the black powdering of the bases of the wings above; on the other hand, the apices of the fore wings above are dull and of a washed-out grey, therefore similar to the winter form, and also to the var. *bryoniæ*. The black powdering of the veins towards the margin of the wings, so characteristic of the males of *bryoniæ*, is completely absent. The butterfly is in great contrast to the male *bryoniæ*. As it was the only one of

* I should not neglect to here express my most grateful thanks to the above-named gentleman for the repeated consignments of living females of *bryoniæ*, by which alone I was enabled to set on foot the following breeding experiments.

its kind, since no more pupæ emerged in the summer of 1887, but all hybernated, I cannot avoid the suspicion, that an egg of the ordinary *napi* might have possibly been introduced with the food-plant, and invalidated the experiment. Repetitions of the experiment can alone make this certain.

The rest of the pupæ hybernated in an unheated room, after they had been kept in the incubator until July 30th, and then in a room, and emerged very irregularly in the spring of 1888, between April 6th and June 2nd, 22 specimens in all, 13 females and 9 males. All are completely normal *bryoniæ*, with one single exception.

One female has, indeed, the usual brown-grey ground colour, and also the usual marking of the female of this form, but this colour is broken up or replaced by white in several places on the hind wings, and in a few smaller ones on the fore wings. The butterfly appears speckled and spotted with white, just as if it had been wetted or sprinkled with white, and the blotches of colour had flowed quite irregularly over the surface of the wings, and had covered the brown-grey or dissolved it. I have never seen such a colouring elsewhere, or found it described.

(To be continued.)

THE SYNONYMY OF THE BRITISH BEE HAWK-MOTHS.

By C. W. DALE, F.E.S.

MR. KIRBY is perfectly right in stating that Linné's name of *fuciformis* belongs to the broad-bordered species. I believe all, or nearly all, entomologists held that opinion up to the time of Staudinger and Wocke's Catalogue, and it is well borne out by reference to numerous figures. One exception is that of Moses Harris, who figured *tipulæformis* for *fuciformis*. In my "History of British Hawk Moths" ('British Naturalist'), I have not departed from the old opinion. Scopoli, in 1763, three years before Linné's 12th edition of the 'Systema Naturæ,' gives *Sphinx fuciformis* as "In Lonicera, Scabiosa," confusing the two species. His figure appertains to the narrow-bordered species, but his description apparently belongs to the broad-bordered one. De Villers, in 1789, also says of *fuciformis*, "Hab. in Lonicera, Scabiosa." It will be noted that Linné says, "Habitat in Lonicera" only.

Now, as to *S. tityrus* being the specific name of the narrow-bordered species, I can positively say the case is not proven. Linné, in his 12th edition, gives *tityrus* as a variety of *fuciformis*, and as such we must believe it to be; but as he makes no reference to the wings having a broad or narrow border, and

his meagre description is not supported by reference to any figure, we must not jump to a hasty conclusion on presumptive evidence only. Guenée always rejected names given by authors whose figures or descriptions were unsatisfactory.

As Linné bestowed the name of *bombyliformis* on a variety, or only a rubbed specimen of *porcellus*, we have no right to regard it as a rejected specific name, and therefore cannot do better than follow our forefathers in retaining for our narrow-winged species the name *bombyliformis*, given to it by Esper.

If the rule that "a rejected name is not again available in the same genus" is intruded into other orders, it will create no end of confusion.

Glanvilles Wootton, Feb. 1st, 1896.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. DE VISMES KANE, M.A., M.R.I.A., F.E.S.

(Continued from p. 57.)

CLEOCERIS VIMINALIS, *Fb.*—A very local species. "Belfast and Killarney" (*B.*). At Markree Castle, Sligo, I took a short series, with the median band, &c., varying in strength, but the outer portion of the wing banded with silvery white. Clonbrock, Co. Galway: one pale and one of the suffused type are recorded by *R. E. D.*

MISELIA OXYACANTHÆ, *L.*—Abundant in most places, and of the reddish brown type. Var. *capucina*, Mill. Howth, one (*S. R. F.*). Favour Royal, Tyrone, a dark form approaching it.

AGRIOPIS APRILINA, *L.*—Often plentiful, but more usually scarce. I have aberrations with a narrow black band from costa to inner margin between the stigmata, and joined to the inferior part of a large black patch outside the reniform. I append a few localities to show general distribution. Co. Dublin and Wicklow, common (Phoenix Park and Powerscourt); near Belfast, ditto; Armagh (*J.*), Tyrone, Monaghan, Cavan, and Westmeath, scarce; Enniskillen, common (*Col. Partridge*); Tullamore, King's Co., Sligo, and Clonbrock, Co. Galway, scarce.

EUPLEXIA LUCIPARA, *L.*—Very common.

PHLOGOPHORA METICULOSA, *L.*—One of our commonest species.

APLECTA PRASINA, *Fb.*—Not infrequent in woodland districts. The Irish form is a peculiarly bright and handsome one, of a bright grass-green, with the design well marked and not darkly shaded. Two very handsome specimens from Kenmare have the orbicular, reniform, and an apical blotch and several

small traits elsewhere, of a ruddy tint of brown madder. This as well as the green fades somewhat by age. Occasional examples occur approaching var. *pallida*, Tutt. It is a remarkable illustration of the erroneous impression generally held in England of the melanic character of Irish Lepidoptera, that this somewhat variable species, like *A. nebulosa* and *Cleoceris viminalis*, tends in quite the opposite direction. None of the dark green forms not unusual in England occur here, much less the melanic Yorkshire variety, of which I have a series varying from dark greenish brown, traversed by pale basal and ante-marginal lines, with an extra-stigmatal blotch, to one wholly obscured by dark olive-brown, with only a few traces of parts of the basal and ante-marginal lines visible in paler brown tint. This variety is not described in 'British Noctuæ,' and as it is a local form at Wharnccliffe deserves the name *eboraci*. Very dark specimens occur also, I believe, at Rotherham, but I think are dark greenish. I have no example of this. I notice this English form as it has a distinct bearing upon the distribution of melanic forms in the British Islands, a question which I propose to refer to again at the close of the Catalogue. Localities:—Howth; Powerscourt, Co. Wicklow (*Greene*); Castle Bellingham, Co. Louth (*Thornhill*); Killynnon, Westmeath (*Miss R.*); Farnham, Cavan; Tempo, near Enniskillen (*Langham*); Drumreask, Monaghan; Favour Royal and Altadiawan, Tyrone, fairly abundant; Markree Castle, Sligo; Castle Taylor, Galway; Castle Townsend, Co. Cork; Kenmare, not scarce; and Killarney.

APLECTA OCCULTA, L.—Two Irish specimens have been taken,—one at Knocknarea, Sligo, by Mr. Russ; the other by Mr. Campbell near Derry. Neither of them is in good condition, but their identity is unquestionable. That from Derry is a very pale form, like a grey *A. nebulosa*; the Sligo one is somewhat darker.

APLECTA NEBULOSA, Hufn.—Generally common in woodlands. The form has a very clear white ground, with the markings sometimes but slightly pencilled, but generally very strongly marked. I have seen no examples of the var. *bimaculosa*, Esp., in black, with grey shadings; but Mr. Dillon, of Clonbrock, has specimens of greyer tone than I have yet taken.

APLECTA ADVENA, Fb.—Not uncommon at Castle Bellingham, Co. Louth, where Mr. W. B. Thornhill has taken a series during the last three seasons. The typical form.

HADENA ADUSTA, Esp.—Very common and widely distributed. The most common Irish form of this species is var. *duplex*, Haw. They vary in tone from brownish black with a purple gloss (which, I presume, suggested the name *adusta*), to the type form of Esper of a rich warm brown, marked with black and paler lines.

About Kenmare I have taken a series of very black specimens, with the markings very obscure; but at Markree Castle, and in Tyrone and elsewhere, the typical form also occurs, but not numerously.

HADENA PROTEA, *Bork*.—Mr. Dillon records the capture of one at Clonbrock, the only Irish example, as Birchall's record of its being found commonly in Wicklow was founded on mistaken information.

HADENA GLAUCA, *Hb*.—The first record of this species was supplied by Mrs. Battersby, of Cromlyn, who took three specimens. It was then taken near Derry by Mr. Campbell and myself. Since then I have found it numerous at Altadiawan, Tyrone; Toberdaly, King's Co.; and Mr. Bristow at Cave Hill, Belfast. Other records are Agher, Meath (*Miss R.*); Markree Castle, Sligo; Howth, one (*G. V. H.*); Enniskillen, one (*Col. Partridge*); and one at Black Rock, a bare rocky islet, some eight miles off the coast of Mayo. Those which I have seen are dark and richly marked, except the specimen of Mr. Campbell's capture, which belongs to var. *lappo*, Dup. Mr. Tutt mentions having received specimens of this variety also from Belfast, where, however, the type form prevails. This moth flies in sunshine to flowers, and I have taken them at those of *Menyanthes trifoliata*.

(To be continued.)

NOTES AND OBSERVATIONS.

ON SETTING LEPIDOPTERA.—It has often struck me as most unfortunate that a greater uniformity in setting has not yet been attained among entomologists. Everyone must allow that a series of insects well set by one pair of hands looks infinitely better than a series made up of specimens got by exchange from various sources; some of which may be set so low on the pin as to touch the paper, others so high as to be nearly at the top of the pin; while the fore wings of some may be almost in a straight line with each other, and of others so pulled forward as to be nearly at right angles. The object of this paper then is to give some hints which may help young collectors in aiming at greater uniformity, and also to impart some "tips" which I myself have found useful.

The first step towards setting an insect is proper pinning; and this step should never be taken with an insect that is not in a properly relaxed condition. Insects, like all other animals, are liable shortly after death to a peculiar rigidity of the muscles, which is called *rigor mortis*, and those killed with chloroform and the cyanide bottle are especially affected by it. After one or two days in the bottle or in a slightly damp box, this rigidity will be found to have passed off, and the insect will be in a perfectly relaxed state. Until this is the case an insect cannot be pinned and set without difficulty and risk of injury.

Insects killed by being stabbed with a solution of oxalic acid may be pinned and set immediately, before the *rigor* sets in, without fear of their subsequently coming to life again. The process of pinning is the most important point in setting, for if the insect be not properly pinned it cannot possibly be well set. Some collectors do not pay sufficient attention to this point, but seem to think that it is quite sufficient to get the pin through the thorax anyhow. It is absolutely essential that the pin should be inserted exactly in the median line above, and should come out exactly in the median line below. Having settled this, the next thing to consider is the exact point in the median line of the thorax for the insertion of the pin. This should be in a line joining the points of insertion of the primaries; and the point of the pin should come out between the points of insertion of the second and third pair of legs. Many collectors bring it out between the first and second pair, so that when the insect is set the pin is perpendicular. It is much easier, however, to bring the pin out as recommended above, and there is much less risk of rubbing off scales from the wings, especially when the wings are folded over the back of the insect. The height up the pin at which the insect should be set is one over which there is a very great variety of opinion, some collectors liking the wings to touch the paper of the cabinet; while others set them nearly at the top of the pin, almost in the Continental way. A happy medium should, I think, be taken. Insects do not look so well when perched on the top of the pin; but undoubtedly they keep much better for being raised some way above the paper. In the first place, should a mite get in, it is much less likely to do damage if it can only reach an insect by climbing up the pin; and secondly, the free circulation of air under the wings keeps the insect much drier, and much less liable to mildew. With a pin of the right size, exactly half way up is a good rule to follow, and insures all insects set on the same size of pin standing at the same level in the cabinet.

The next thing to settle is the size of the setting-board. The groove must be large enough to take in body and legs easily without any squeezing, and the width of the board should be about one-fifth more than that of the outstretched wings of the insect. It is a good plan to make a hole with a small glass-headed steel pin in the board in exactly the place and in the same direction that you require the pin of the insect to go. By this precaution all risk of bending the pin and perhaps spoiling the insect is avoided. Great care must be taken to get the body at exactly the right level in the groove. If too low, the wings will spring up after removal from the board; if too high, they will droop too much. As soon as the insect is properly pinned on the board, the legs should be attended to: the first pair just resting on the edge of the groove, and the second and third pairs carefully pushed down into the groove alongside of the body. This is very important; for if one of these legs is at all above the edge of the groove, it will interfere with the lay of the secondary wing.

Next the antennæ should be got into position, and, if necessary, held in place by pins. It is a great advantage to make the antennæ lie almost parallel with the costa as it will be when the insect is set. Antennæ set in this position are much less liable to be broken, and specimens can be placed much closer together in the series.

The next point is to hold the wings down, so that they may be drawn into their proper position. A small square piece of cork, a pin, and a bristle from a hair-brush, make a capital contrivance for doing this. The bristle may be easily inserted in the proper position by making a hole in the cork first with a needle. For large, stiff-winged insects a fine needle may well be used instead of a bristle. The bristle is passed down between the upright wings, and the pair pressed down till they lie close to the board, but loosely. In this position they can easily be manipulated into place by a needle pushed under the hind margin of the primary, and the secondary can then generally be easily worked into place. When the wings are in position, the cork is pinned tightly down, and the bristle will then hold the wings in their place, and the needles can be removed. The other pair of wings is then got into position in the same manner. Several points have to be considered with regard to the position of the wings. Some collectors seem to think that the costa should be at right angles to the body; whilst others, running to the opposite extreme, set the wings so that the two costas shall form a right angle. Here, again, the happy medium is best. In the former case the secondaries are not properly displayed; in the latter this is done, but their inner margins are drawn too far away from the body. I think a safe rule is to set the primaries at such an angle that while the secondaries are fully displayed, their inner margins shall be parallel with the median line of the body, *while not allowed to touch it*. This precaution is necessary to prevent grease spreading to the wings should the body become greasy some little time before it is noticed. The secondaries should be advanced so far under the primaries as to leave a very small portion of their cilia covered. No young collector can go far astray if he takes as his patterns the figures of the insects as given in Newman's or Barrett's books; and if every collector used such a model, a great step towards uniformity in this point would be gained. A great advantage in using bristles as above described, is that the insect when thus fixed in position can be viewed as a whole, and both sides set at exactly the same angle. When one side is wholly or partially covered by straps, any inequality is much less easily seen. I have found it a great help to getting both sides alike, to have pencil lines ruled across the boards at right angles to their length. It is then very easy to see whether both sides are advanced to exactly the same extent. The next thing is to fasten the wings down so that they shall remain in position till the insect is quite dry. To do this some collectors use narrow bands of card or paper. A broad strip of thin paper large enough to cover the whole of the wings is preferable. It ensures the drying of every part of the wings at the same rate of time; it prevents lines being left on the wings, and it flattens all the cilia and all the scales on the wings. Paper a little thicker than tissue-paper—semi-transparent is good, because it enables one to see if a wing slips at all when the bristle is removed. This paper is easily placed so as to come close to the bristle, and cover nearly the whole of both wings and the antennæ. For all insects under the size of *T. pronuba*, three pins are sufficient. When the paper is firmly pinned down, the bristles are to be removed.

The last thing is, if the groove be large and the body drops, to raise it into the proper position by a pin placed under the body on each

side. The insect must be then left until quite set. This may be tested by touching the end of the body with a pin or needle. If this is quite stiff and immovable, the insect may safely be considered set.

To conclude: uniformity in setting among collectors, for their own cabinets at least, is to be obtained:—first, by always pinning in one way; second, by always raising the insect to the same proportional height up the pin, half-way being an easy way of obtaining this regularity; third, by taking an illustrated entomological book as a pattern for the angle of the wings with the body; and fourth, by using the same size of board for insects of the same size.—F. C. WOODFORDE; January 21st, 1896.

VANESSA URTICÆ AB.—In looking through my collection of Lepidoptera, I have just come across a specimen of *Vanessa urtica* labelled: "August 20th, 1892. Castle Hill, W." It measures only a trifle over $1\frac{1}{2}$ in. across the fore wings. Is not this exceptionally small for this species? I well remember taking the specimen, and being surprised upon netting same to find that it was *V. urtica*. There is nothing very unusual about the coloration. The blue markings are much paler than ordinarily, especially on the fore wings, and instead of being wedge-shaped as usual are kidney-shaped. The two spots near the middle of each fore wing are very small and inconspicuous, and are enclosed in a cream-coloured space, which on the left wing juts out as far as the border. The under side, excepting that it is of a reddish hue, shows no difference from the ordinary marking. I should like to know whether this is an uncommon form of the species—A. E. ALLWORTHY; 61, Lancaster Road, Stroud Green, N., February 9th.

TENACITY OF LIFE IN INSECTS.—In reference to this subject the following notes may be of interest. When I was still new to collecting in South France, I discovered one day, to my great joy, a large female of *Saturnia pyri* hidden away in some bushes. The specimen was the first I had ever caught, and I decided, on account of its large body, to stuff it (a quite unnecessary operation; I have kept dozens since unstuffed). The moth was first killed (apparently) by being forced, with some difficulty, into a cyanide-bottle, where it was left, I should think, about an hour. The abdomen was then emptied (the contents including a large number of ova), and the cavity filled with cotton-wool soaked in a saturated solution of mercuric chloride. The insect, pinned and set, was discovered next day attempting to fly away from the setting-board. In reference to *Zyganida*, a very strong cyanide-bottle kills slowly. Bisulphide of carbon applied with a brush stupifies instantly, but it may be necessary to apply again later to kill effectually. It is unpleasant to use; impossible indoors.—J. C. WARBURG; Villa Raphael, Cannes, January 31st, 1896.

IMPORTANT SALE OF BRITISH LEPIDOPTERA.—On the 9th and 10th of March next, the collection of Mr. Clarence Fry will be sold by auction at Stevens's, King Street, Covent Garden. I lately had an opportunity of looking through this collection, and it occurred to me that it might be of interest to make a note of some of the rarer species contained therein. In the first place there are several grand examples of the extinct *Chrysophanus dispar*; a few examples of *Sesia andreni-*

formis, taken by the late Mr. Wilkinson on Durdham Down, near Bristol, as they were flying over an old thorn bush; some specimens of *Lasiocampa ilicifolia* from Cannock Chase, 1854; one example of *Hadena satura*, taken by Mr. Osborn on Newmarket Heath; two specimens of *Xylina lambda* var. *zinckenii*, captured by Mr. W. Clare, September, 1877, at Ranworth; one *Catocala electa*, taken by Mr. Vine at Shoreham in 1875; four specimens (one a curious variety) of *Ophiodes lunaris*, all authenticated. There are nice series of *Vanessa antiopa*, *Lycana acis*, *L. arion*, *Deiopeia pulchella*, *Lælia cænosa*, *Drepana harpagula* (*sicula*), *Dicranura bicuspis*, *Synia musculosa*, *Leucania vitellina*, *Hydrilla palustris*, *Dianthæcia barrettii* (some grand specimens), *Noctua subrosea* (including two bred specimens), *Cucullia gnaphalii*, *Cleora angularia* (*viduaria*), &c. The collection of Tortrices formed by the late Mr. Standish, and bought by Mr. Fry, will also be included in the sale. This collection is of great interest, and includes splendid series of *Peronea*, more especially of *P. cristana* and *P. hastiana*, and a nice series of the rare and local *Eupæcilia gilvicomana*. The cabinet in which these Tortrices are was made by Standish.—RICHARD SOUTH.

CAPTURES AND FIELD REPORTS.

NOTES ON THE LEPIDOPTERA OF 1895.—In this neighbourhood one of the most noticeable features in the past entomological season was the scarcity of butterflies; for instance, I only saw a single specimen of *Vanessa io*. Sugaring on the whole was a decided failure. In the early part of March *Phigalia pilosaria* was rather common on tree-trunks. The spring Hybernidiæ were less common, and a full fortnight later than in 1894.

An evening at fallow-blossom on April 20th produced a few *Taniocampa rubricosa*, *Xylocampa lithoriza*, and *Lobophora lobulata*; *Cidaria suffumata* and *C. miata* were also taken, the latter at rest, and in excellent condition for an hibernated insect. Some captures at electric light during this month included *Amphidasys prodromaria*, *Biston hirtaria*, and *Taniocampa gracilis* (2).

During the latter half of May electric light was very attractive, the best things being *Smerinthus ocellatus* (3), *S. populi*, *Callimorpha jacobæ*, *Notodonta dictæa* (3), *N. camelina*, *Dicranura bifida* (2), *Acronycta aceris*, *Taniocampa rubricosa*, *Hadena adusta*, *H. trifolii*, &c. Sugaring one night only produced a few *Gonoptera libatrix*, *Dipterygia pinastri*, and *Hadena thalassina*. Some of the species netted in the woods included *Ephyra punctaria*, *Phoxopteryx mitterpacheriana* (new to Suffolk list), *Incurvaria musculella*, *Loxotania musculana*, *Halonota cirsiiana*.

During the first part of June I was collecting in North Devon. Being favoured with lovely weather, daytime collecting was profitably pursued. *Pararge egeria*, *Thecla rubi*, *Anthocharis cardamines* (as late as the 7th), and worn *Argynnis selene* were very common; strange to say I have never seen *P. egeria* in Suffolk, though it occurs in the county. Among others taken on the wing were *Chelonia villica*, *Arctia fuliginosa*, and *Heliothis arbuti*. On the 3rd I found a lovely male specimen of *Stauropus fagi* at rest on a conservatory window. A rather curious incident happened on the same evening. Noticing a large moth flitting about among some ivy, I endeavoured

to net it, but failed. Subsequently feeling something fluffy in my trousers pocket, I drew out a specimen of *Odontopera bidentata*, which had wedged itself into the farthest corner, still lively, but with a somewhat shabby appearance. A choice series of *Hypena crassalis* were secured in the woods, together with *Emmelesia decolorata*, *Melanippe ocellata*, and *Eupithecia castigata*; while *Halias prasinana* and larvæ of *Bombyx neustria* were beaten in abundance from oak. In the lanes were taken *Cidaria russata*, *Coremia propugnata* (2), *Emmelesia affinitata*, *E. decolorata*, *Neuronina pulveraria*, *Corycia temerata*, *Melanippe unangulata*, and *Lobophora viretata* (at rest on ash-trunk). At raspberry-blossom were secured *Hadena dentina*, *Habrostola triplasia*, *Apamea basilinea*, *Grammesia trilinea*, and *Xylophasia rurea*. Sugar was tried on the 11th, but the only insect taken was *Thyatira batis*. Whilst sugaring, *Melanippe albicillata*, *Tephrosia crepuscularia*, *Agrotis porphyrea*, and a fine specimen of *Boarmia repandata* (var. *conversaria*) were netted. *Lithosia mesomella* was kicked up on the 12th from a heathy slope, where *Eubolia palumbaria* and *Fidonia atomaria* were abundant and in fine condition. At Clovelly, whilst strolling along the well-known "Hobby-drive," to my surprise a fine *Notodonta trepida*, female, fluttered down to my feet. Whilst beating for Coleoptera at Ipswich, on the 14th, two *Limacodes testudo* (in cop.) fell into the umbrella, with *Adela degeerella* and *A. sulzella*. Electric light yielded *Eupithecia rectangulata*, *Amphidasys betuluria* (doubledayaria), and *Cidaria dotata*. From a clematis hedge were beaten or taken at dusk *Melanippe procellata*, *Phibalapteryx vitalbata*, *P. tersata*, *Acidalia scutulata*, *Eupithecia subciliata*, *Leucania comma*, *Dianthæcia capsicola*. *Angeronia prunaria*, female, was also taken at dusk; and *Hecatera serena* from a tree-trunk. Sugar in June produced *Mamestra albicollis*, *M. anceps*, and *Miana fasciuncula*, &c.

During July light was very productive, the better species at electric light being *Notodonta dictæoides*, *Liparis salicis*, *Apamea ophiogramma*, *Cleoceris riminalis*, *Plusia pulchrina*, *Pyrallis farinalis*, *Tortrix forsterana*; whilst one of the large "hawks" occasionally made a little sport. *Thera firmata* was taken on palings on the 18th. The following species were taken at dusk, &c.:—*Geometra papilionaria*, *Pericallia syringaria*, *Epione apiciaria*, *Iodis vernaria* (2), *Lygdia adustata*, *Coremia quadrifasciaria*, *Macaria notata*, *Thyatira derasa*, *Agrotis corticea*, *Eupithecia corynata*, *E. subciliata*, *Anticlea rubidata*, *Cidaria picata*, *Scopula lutealis*, *Aphomia sociella*, *Xanthosetia zægana*, and *X. hamana*. From gas-lamps were taken *Eupithecia subfulvata*, *E. centaureata*, *E. sobrinata*, *Nola cucullatella*, and *Herbula cespitalis*; whilst sugar yielded *Acronycta megacephala*, *A. rumicis*, *Cerigo cytherea*, *Noctua brunnea*, *N. baia*, and *Orthosia upsilon*.

During August, in addition to the foregoing species, at sugar, were *Macaria notata*, *Cymatophora diluta*, *Noctua umbrosa*, *N. plecta*, *N. dahlia* (common), *Cosmia affinis*, *Orthosia suspecta*, *Hadena protea*, *Mania maura*, *Crambus pinetellus*, *Tortrix heparana*. Electric light was perhaps more attractive this month than in any other. The species taken included *Notodonta dictæa*, *N. dromedarius*, female, *N. ziczac*, *Ptilodontis palpina*, *Ennomos fuscantaria*, *Triphena ianthina*, *Charæas graminis*, *Hydræcia petasis*, *Agrotis puta*, *Aspilates citraria*. Gas-lamps yielded *Eupithecia nanata*, *Acidalia promutata*, *Pelurga comitata*, *Heliophobus popularis*, and *Tethea subtusa*. The following were beaten in the woods:—*Grapholitha nissana*, *Pædisca corticana*, *Teras caudana*, *Peronea favillaceana*, where *Liparis monacha* also was taken from an oak-trunk on the 25th.

On September 7th I took a specimen of *Colias edusa*, male, near Fox-hill heath; where also I obtained *Heliophobus popularis* on grass-stems, *Depressaria umbellana* (new to Suffolk), and about twenty larvæ of *Bombyx rubi*. At electric light were taken *Ennomos fuscantaria* and *H. popularis*; and from gas-lamps, *E. fuscantaria*, *Anchocelis lunosa*, and *Xanthia gilvago*. Insects of a common order came freely to sugar, including *Thera variata*, *X. gilvago*, and *Orthosia macilenta*.

In October the only things of note were *Polia flavicincta* and *Xylina rhizolitha* from palings.

As November opened with early frosts collecting had to be abandoned, so far as the imago was concerned. On the 17th, however, whilst paying a visit to the woods, I took a few *Hybernia defoliaria*, male and female, and *H. aurantiaria*, male (2), at rest on palings and tree-trunks. On my return in the evening, which turned out to be one of those warm and muggy evenings we so rarely get amid a spell of cold weather, I had the good fortune to take from three gas-lamps, *Himera pennaria*, *Pæcilocampa populi* (3), and *Petasia cassinea*, which brings to an end the list of a successful season's captures.—ERNEST BAYLIS; Burrell Road, Ipswich.

STRAY NOTES ON THE DIURNI DURING 1895. — The majority of the following notes of dates and occurrences were made by myself in the Isle of Wight, where I spent the greater portion of last summer:—

Leucophasia sinapis. This species I sought for in vain in the Isle of Wight during the spring. One specimen was taken at Sidmouth (South Devon) on July 16th, but no more were seen.

Pieris brassicae. First brood decidedly rare. First appearance, May 22nd, and only three subsequently seen. Second brood (from July 19th) fairly abundant.

P. rapæ. First specimen, April 11th.

P. napi. May 9th, &c. Second brood in by far the greater profusion.

Euchloë cardamines. May 8th to June 21st, common.

Gonopteryx rhamni. This butterfly seems by no means abundant in the island; only a few hibernated, and but two later freshly-emerged specimens came under my notice. There are some fine bushes of *Rhamnus frangula* in Parkhurst Forest, and in some other copses. *R. catharticus* I was unable to find, though its name appears in the island flora; but it can scarcely be common.

Colias edusa. The first specimens seen (hibernated, I presume, though I was unable to net any) appeared early in June; on the 9th several were seen flying hurriedly along the Undercliff. No more were noticed till July 7th, on which day, and the four succeeding ones, a few freshly-emerged examples, mostly males, were captured on the coast of South Devon. From July 29th till early in September (when I left the Isle of Wight), this butterfly was more or less common all over the island, more being seen on the rough flowery slopes of the Undercliff than elsewhere perhaps; but in the Carisbrooke district it was by no means rare. Owing, I suppose, to the rough windy weather that prevailed early in August, when the greater number were emerging, perfect specimens were rarely obtainable. Two specimens of the variety *helice* were met with, and others were reported. A wasted specimen of *edusa*, accidentally left in a box, was found to have laid a single egg, which hatched on Aug. 22nd; larva pupated Sept. 25th; and the butterfly, a male, emerged Oct. 13th, evidently an example of a second brood of this species. The

very early date of the first Devonshire specimens is noteworthy; they were undoubtedly fresh ones, in fact finer specimens than any I subsequently saw.

Argynnis paphia. From July 5th. In the greatest profusion near Sidmouth about the 16th. Common in the Isle of Wight till Aug. 24th.

A. aglaia. By the 27th of June this species was out in abundance on the South Devon coast.

A. adippe. Fairly common between Sidmouth and Honiton on July 17th.

A. euphrosyne. From May 7th till June 11th, very common. On two occasions a female was observed to lay an egg on a leaf of honeysuckle, a spray of which was twisting amongst the violet plants in Parkhurst.

A. selene. Parkhurst Forest; not common.

Melitæa cinxia. This species I found in disappointing scarcity in its haunts on the Undercliff. Two small colonies were observed between Ventnor and Blackgang, and a few odd specimens turned up in other spots. On June 8th most of the specimens seen were worn, though I record one subsequently as late as the 23rd. It seemed a pity to deplete their already scant numbers by netting any, though I am in hopes that the species showed exceptional rarity last year, and may recover somewhat its former abundance. Perhaps the excessively severe frosts of the previous winter were detrimental to the larvæ. At all events, one of the colonies I discovered can hardly have been affected, either by ardent collecting or the spread of cultivation, as it had its headquarters on a very steep cliff, a partial descent of which was not accomplished without caution and difficulty, and where a very free use of the net was impossible.

Vanessa urticae was abundant throughout last summer.

V. polychloros. Only one hibernated specimen was seen, on May 6th; absence from the island during the time of emergence prevented my seeing the later specimens, but the species was, to my knowledge, taken at Parkhurst. A specimen seen between Sidmouth and Honiton on July 17th is interesting, as the insect seems to be rare in South Devon.

V. atalanta. Hibernated specimens were seen early in June. Fresh examples, from July 5th, abundant throughout the summer; larvæ commonly seen. This species seems undoubtedly capable of producing a second complete brood in dry warm seasons. On Aug. 18th a specimen, in the finest condition, I observed deposit two ova on the top of the youngest leaf of a nettle at Freshwater. On the 23rd these hatched, the larvæ pupated on Sept. 23rd, the butterflies emerging on Oct. 7th, a date on which larvæ that have been obtained at large frequently reach maturity. For the first few days of their lives the larvæ refused even the tenderest nettle-leaves, but descended the petioles, and fed upon the stipules and immature flower panicles. Entomologists possessing a microscope will do well to examine the exquisite egg of this species when obtainable.

V. cardui. Hibernated specimens of this species, from May 31st till the middle of June, were by no means rare, especially on the Undercliff. My expectations of an abundant summer brood were, however, hardly justified, as I record a bare dozen specimens through Aug. and early Sept.

Limenitis sibylla. This species was found commonly in Parkhurst Forest, during the end of June and first half of July. On my return to the island, towards the end of the latter month, only a few wasted specimens were seen.

Arge galathea. Common on the coast east and west of Sidmouth in July, and a stray specimen close to Honiton. A few single specimens in the Isle of Wight at the end of the month.

Satyrus egeria. From April 19th, throughout the season, very common in the island. I think that this species must undoubtedly hibernate, both as larva and pupa. In a wood which I was in the habit of visiting daily, it was noticeable that after the examples of the first spring emergence had become decidedly and pretty uniformly worn, a new supply of what were obviously freshly-disclosed specimens presented themselves towards the end of May.

S. megæra. From May 11th; both broods in abundance. Larvæ from ova laid on Aug. 13th are now hibernating; they have never entirely ceased feeding during the whole of the mild winter which we are at present experiencing.

S. semele. This species was already abundant in South Devon by June 27th. I had not seen it in the Isle of Wight previous to this date, where it abounded later on in the season.

S. ianira. From June 6th. No bleached specimens seen last season.

S. tithonus. From June 27th, in abundance, till Aug. 30th.

S. hyperanthus. From June 30th till Aug. 7th. This butterfly always seems to be for a much shorter time on the wing than any of the other single-brooded Satyrs. This seems rather to point to the probability of the larvæ being more nearly of the same age previous to hibernation.

Cænonympha pamphilus. First appearance, May 8th.

Thecla rubi. From May 9th (Isle of Wight) till July 11th (S. Devon).

T. quercus. Very abundant at Parkhurst in July and August.

Polyommatus phleas. From May 9th till Oct. 17th. On Sept. 29th some females were seen, busily engaged in depositing their ova on dwarf plants of *Rumex acetosella*. On examination a profusion of ova were discovered on them. This plant is so hardy, even in severe winters, that probably it affords the most suitable resting-place for the winter larvæ of *P. phleas*, which hibernate at different ages, and feed in mild weather.

Lycæna ægon. Not observed in the Isle of Wight. By June 29th in abundance on the South Devon coast.

L. agestis. Very few of the first brood seen; the second brood in fair numbers, both in South Devon and Isle of Wight.

L. alexis. From May 12th, in abundance. An interesting variety of the under side of a male was procured near Atherfield, Isle of Wight. In it the normal fawn ground-tint is completely usurped by pure white, the former being restricted to a few slashes along the base of the wing-rays, the spots on the fore wings being prolonged into broad dashes.

L. adonis. Of the first brood of this species I was unable to find any examples, although, wishing to procure some for a friend, special search was made for it, and that in known localities. In August, however, it turned up abundantly, being specially common near Carisbrooke; also being found near Ventnor, near Mottistone, and sparingly on the Freshwater downs.

L. corydon. By July 22nd abundant in the island, often in profusion, till the end of August. The bulk of the males appear before the females are visible. Specimens of the latter, with the spots on the fore wing under side coalescing into horizontal bars, not rare, frequently occurring on one side only.

L. alsus. Sparingly near Carisbrooke and on the Undercliff. Although out on May 27th, I met with a solitary fresh specimen on July 22nd.

L. argiolus. A solitary specimen of the first brood seen, but in the first half of August common, locally, at Carisbrooke; also about the

wooded portions of the Undercliff. Eggs and larvæ of this species were found by searching the young umbels of ivy-bloom, and the species successfully reared thereon. Of the resulting pupæ a single specimen (female) emerged on Sept. 30th; the rest are hibernating. It is noteworthy that holly is entirely absent from the locality where the butterflies and ova were found.

Nemeobius lucina. A single specimen was netted on May 10th, in a copse near Parkhurst Forest. Though the weather at the time was perfect, a persistent search failed to reveal any further examples.

Syrichthus alveolus. May 2nd till June 11th.

Thanaos tages. May 6th till June 13th.

Hesperia sylvanus. May 28th till July 23rd.

H. linea. June 30th, S. Devon, and during July in the Isle of Wight.

A feature of last season was the abundance of specimens of the second brood of double-brooded species, as compared with the very sparing numbers that appeared of the first emergence. Possibly the very great severity of the latter part of the previous winter had something to answer for in this, following as it did the exceptionally mild weather that prevailed till just after Christmas, 1894. Doubtless a longer residence in the Isle of Wight, during last autumn, would have revealed some interesting instances of partial double and triple broods amongst species normally single and double-brooded.—R. M. PRIDEAUX; Buckhurst Hill, Essex, Feb., 1896.

MACRO-HETEROCERA IN THE GUILDFORD DISTRICT.—The district is the same as that mentioned in my list of Rhopalocera (Entom. xxviii. 150), but in the present instance I make even less claim to giving a complete list of Macro-Heterocera, as I have not thoroughly worked the district. As a matter of fact, a very large proportion of the species have been taken in my own garden (which is situated close to the town itself, and some distance within the borough boundary); it is neither larger nor more sheltered than the other gardens in the vicinity, and is in no way different, except it receives perhaps rather less attention from a gardener's point of view than some others; but possibly this may be somewhat to the advantage of its entomological fauna. With the single exception of *Sphinx convolvuli*, all the species mentioned were taken or bred by myself. Those taken in the garden are marked with an asterisk.

SPHINGES.—*Sphinx convolvuli*. I have but two specimens of this species. One was sent to me from Bramley (a village about three miles and a half distant), Oct. 15th, 1886; it is not in good condition. The second was taken close to my house, and brought alive by some children, Aug. 20th, 1887; it is in good condition.—*S. ligustri*. A full-fed larva, found Sept. 12th, 1894, from which a fine specimen was bred, June 20th, 1895. Have had several other larvæ before, but failed to obtain imagos.—*Chærocampa elpenor*. A larva, found Aug. 3rd, 1892, from which a fine imago was bred, May 30th, 1893.—**Smerinthus populi*. Fairly common (chiefly as larvæ) in the garden. I found a much-damaged female there on April 30th, 1893. Obtained about forty ova, nearly all of which proved fertile. The larvæ fed up quickly, and one male emerged July 28th of the same year, the rest of the brood emerging in June and July, 1894. One of the males is very pale, the same colour as the palest female, and with the usual markings rather indistinct.—**S. tilia*. Not common. A few larvæ found in the garden at various times; one in Aug. 1885, from which an imago was bred, May 25th, 1886. The larvæ found since have all failed to produce imagos.—**Macroglossa stellatarum*. Two taken in the garden in

Aug. and Oct. 1893; and one or two seen several years before, but not captured.—*M. fuciformis*, L. One specimen taken June 8th, 1892. It was hovering over a patch of *Nepeta glechoma* in a wood; two others seen near the same spot in the following year.—**Sesia tipuliformis*. I have found a few larvæ of this species in an old bush of red currant in the garden, and reared a small number of imagos from them.—*Zygæna filipendulæ*. Fairly common in several places on the downs. Not met with until 1895.

BOMBYCES.—*Hylophila prasinana*. One specimen taken at rest on a park fence, May 21st, 1892.—*Lithosia lurideola*. A few single specimens at various times, but not more than half a dozen in all.—*Euchelia jacobææ*. Larvæ common every year on *Senecio jacobææ*. Have never seen but one imago on the wing. A male bred June, 1892, has the hind wings pink and the crimson markings on the fore wings rather lighter than usual. Is this a common form of variation? The specimen is not crippled in the least.—*Nemeophila russula*. A male taken June 22nd, 1892; others seen at the same time, but not captured.—**Arctia caia*. Fairly common, chiefly as larvæ, but these were much more numerous ten years ago than at present.—*Spilosoma fuliginosa*. A much-worn pair taken in cop., April 8th, 1894; ova obtained, but all proved infertile. Is not the above very early for this species?—**S. lubricipeda*. A few odd specimens at various times; also a few larvæ.—**S. menthastri*. Fairly common.—**Hepialus humuli*. Very common.—**H. lupulinus*. Abundant everywhere.—*H. hectus*. Common in one wood, but not seen elsewhere.—**H. sylvanus*. A few in the garden.—**Porthesia similis*. Two specimens taken in 1886, but not seen since.—**Dasychira pudibunda*. One larva found in the garden, Aug. 15th, 1892. Imago emerged April 28th, 1893.—**Orgyia antiqua*. Very common, chiefly as larvæ.—**Pæcilocampa populi*. One male, Nov. 14th, 1885; and two others in the following year.—*Bombyx neustria*. Larvæ very common in some years. Have not seen more than three or four imagos.—*Odonestis potatoria*. Larvæ fairly common; many imagos bred, but nearly all males.—*Drepana binaria*. One larva found in 1885, and imago bred.—*Cilix glaucata*. Fairly common in most years.—*Dicranura vinula*. Two cocoons found on a sycamore tree, May, 1886. A fine female emerged May 29th; the other pupa died. Have had several larvæ since, but all died.—**Pterostoma palpina*. One larva, Sept. 15th, 1893. Imago emerged May 1st, 1894.—*Lophopteryx camelina*. One taken in 1885. Have had several larvæ since, but failed to obtain imagos.—**Notodonta dictæa*. A few at light in the house. One larva on poplar, June 22nd, 1893. Imago bred Aug. 10th.—**Phalera bucephala*. Very common. Two or three broods of larvæ in the garden every year.—*Thyatira derasa*. A few odd specimens taken among *Rubus idæus*, which is rather common in the district.—W. GROVER; Guildford, Nov. 1895. [To be continued.]

ADDITIONAL NOTES, WITH DATES, FROM READING.—*Hybernia leucophaaria* occurred during a break in the cold weather on Jan. 20th, 1895, from this date hard frost continued till the beginning of March. From March 6th *H. leucophaaria*, *Anisopteryx æscularia*, and *Phigalia pedaria* could be taken commonly till the middle of the month. On the 17th *Asphalia flavicornis* and *Brephos parthenias* were out. By the 22nd *A. flavicornis* was to be obtained in some numbers by searching the tops of low birches. I know no moth more easily seen when resting on young birch. It has no protective resemblance, either in colour or form, to the brown branches and twigs of young growth. I worked from the 5th to the 17th of April for *Endromis versicolor*, but did not repeat my success of the two

preceding years. Three females, as already recorded, were taken, two on the 11th and one on the 12th. This species with us makes no headway; it must be put down as one of our rarest insects. *E. versicolor* is holding on precariously; slightly more adverse conditions obtaining, it would as certainly disappear from its Reading station as it did from Tilgate, from well-known causes. *Leucophasia sinapis* appeared on May 4th, was at its height on the 12th, and continued here on the wing till June 3rd, though in West Dorset it lingered on till the 15th. *Stauropus fagi* and *Dasychira pudibunda* were out by May 7th, and *Argynnis euphrosyne* by the 12th. On the 27th *Minoa euphorbiata* and *A. selene* were out and in fine condition, while on the 30th *Bapta taminata*, *B. temerata*, *Eupithecia venosata*, and *Anticlea sinuata* appeared. Common spring Noctuæ came freely to sugar on June 1st, and on the 3rd *Epione advenaria*, *E. plumbeolata*, *M. euphorbiata*, and *Boarmia consortaria* were to be had more or less plentifully in their special haunts. On the 9th I had the pleasure, with my friends Messrs. Harmer and Holdway, of witnessing the assembling of *Sesta sphegiformis*; on the same date I saw *Thecla rubi* for the last time. On the 10th, with the wind at N.E., a few *Aplecta nebulosa* and *Dipterygia scabriuscula* came to sugar. *Ephyra omicronaria*, *Abraxas ulmata*, and *Asthena blomeri* were out on the 11th, and *Melanippe hastata* on the 12th. In West Dorset, on the 17th, *Tanagra atrata* was in fine condition, while *Emmelesia affinitata* was worn; by the 20th *A. aglaia* had appeared and *Zygæna trifolii* was flying freely. *Melanargia galatea* first appeared on the 26th, but on this day *Toxocampa pastinum* and *Lycæna minima* were worn. At Reading by July 3rd *T. w-album* had appeared, and *A. blomeri* was still in fine condition. *L. corydon* was out on the 10th. On the 16th *Calymnia pyralina* appeared at sugar; twos and threes of this insect were taken most evenings for the following fortnight. On the 17th *Noctua stigmatica* appeared, and continued on the wing till Aug. 20th. *C. affinis* was out in some numbers, and *C. diffinis* sparingly during the week commencing the 21st. Amongst the junipers *Eupithecia sobrinata* was well out on Aug. 5th, and an occasional *Hesperia comma* was seen. On the 20th *Hadena protea* first visited sugar. The second brood of *A. selene* was out on Sept. 3rd, on the 5th *Xanthia citrargo*, the 6th *Asphalia diluta*, and on the 14th the first *X. aurago* was taken. This last insect came to sugar more or less freely till the second week in October. *X. gilvago* appeared in limited numbers during the first three weeks of the month. *Epunda lutulenta* was first taken on the 18th, two or three others being subsequently captured. One *Xylina semibrunnea* was taken on the 28th and a few more were secured during the next ten days. A second brood of *N. stigmatica*, fed up in doors, began to emerge on Dec. 22nd.—J. CLARKE; Reading, Jan. 1896.

LARVÆ OF *CHÆROCAMPA PORCELLUS*.—In Mr. Theobald's remarks concerning the appearance of Sphingidæ in East Kent (*ante*, p. 65), he states that he failed to find the larvæ of *Chærocampa porcellus*. Few larvæ that are not internal feeders are harder to find in the daytime. The collector has to encounter two difficulties. The first lies in the nature of the food-plant. On a casual observation, it is not easy to detect where a larva has been at work. Its habit is to strip the spray of bedstraw, leaving the bare stem. If, in a cluster of bedstraw, stems appear thus denuded, the *C. porcellus* larva has been at work. The second difficulty lies in the habits of the larva itself. During the day it hides among the roots of grass and bedstraw, and as close to the ground as possible. Here its sombre

colour renders detection difficult. It is possible for the collector to unearth it from its hiding-place, but the prize is scarcely worth the effort entailed. By far the best plan is to mark the spot where the bedstraw has been eaten, and return to it at night. At the end of last July I noticed that several patches of bedstraw (*Galium verum*) were extensively eaten. Feeling sure that *C. porcellus* larvæ were at work, I searched hard, practically on hands and knees, at intervals amounting to about four hours. The result was I secured four nearly full-fed larvæ. Subsequently I visited the same spot with a lantern, at 10 p.m. Then I had no difficulty in securing ten larvæ in as many minutes. On this occasion there was a drizzling rain, which caused the larvæ to have the appearance of so many large snails glistening in the light of the lantern. I feel certain that in most localities where there is an abundance of bedstraw, collectors would find it worth their while to examine likely spots by night.—C. A. E. RODGERS; The Wells House, Malvern Wells.

RECENT LITERATURE.

A Handbook of the British Macro-Lepidoptera. By BERTRAM GEO. RYE, F.E.S. With Hand-coloured Illustrations by Maud Horman-Fisher. London: Ward & Fowler, 1894-1895. 8vo. Vol. i., Parts I.-IV.

NOTWITHSTANDING the number of books published on British Lepidoptera, there seems to be no end to the supply; and Mr. B. G. Rye, one of the sons of the late Mr. E. C. Rye, the well-known Librarian to the Geographical Society, and Editor of the 'Zoological Record,' has commenced a work on somewhat similar lines to that of Mr. C. G. Barrett, but smaller, less elaborate, and less expensive. The introduction relates to metamorphoses and classification, and the portion of the work before us extends to *Argynnis*. There is a useful plate illustrating details and neurulation; and the coloured plates are on the whole very good, and include figures of many interesting varieties.

The classification adopted for the butterflies is as follows:—Papilionidæ, Pieridæ, Nymphalidæ, Apaturidæ, Satyridæ, Lycænidæ, Erycinidæ, and Hesperidæ. The position assigned to the Erycinidæ is somewhat unusual; but we think that Mr. Rye has done quite right to treat the Papilionidæ and Pieridæ as families rather than subfamilies, the absence of the internal nervure on the hind wings being so very salient a character in the former. We hope to refer to this book again.

British and European Butterflies and Moths (Macrolepidoptera). By A. W. KAPPEL, F.L.S., F.E.S. (Assistant Librarian, Linnean Society), and W. EGMONT KIRBY, L.S.A., Authors of 'Beetles, Butterflies, Moths, and other Insects.' With thirty coloured plates by H. Deuchert and S. Slocombe. London: Ernest Nister. New York: E. P. Dutton & Co. Printed in Bavaria. 4to, pp. 273, double cols.

WE have here another popular work on British Macrolepidoptera, which deserves notice for the unusual excellence of the plates (though some figures are slightly above the natural size), and for its including

figures of many of the more interesting European species in addition ; while the letterpress, which seems to have been carefully compiled, includes full descriptions of all the British and most of the Central European species in addition. The introduction contains the usual information on structure, transformations, collecting, and rearing, and is illustrated by several woodcuts. We notice that this handsome volume is entirely printed, illustrated, and bound in Bavaria ; and, although this is accounted for in the present case by its being issued by a German firm, we would ask, how is it that so many coloured illustrations come from Germany ? Is the difficulty in the price or the quality of English work ?

The Label List of British Lepidoptera. Compiled, after 'A Handbook of British Lepidoptera,' by EDWARD MEYRICK, B.A., F.Z.S., F.E.S., &c. London : Watkins & Doncaster, 36, Strand, W.C. 1890.

WHEN presented in the form of a List, the revolutionary character of the new classification of Lepidoptera, proposed by Mr. Meyrick in his 'Handbook of British Lepidoptera' (noticed Entom. xxviii. 318), stands out with startling prominence. Old familiar tribal headings, such as Sphingæ, Bombycæ, Noctuæ, and Geometræ, have disappeared, and in their place we have CARADRININA, NOTODONTINA, and LASIOCAMPINA. The species hitherto arranged under the former are curiously divided and redistributed among the latter.

CARADRININA, which is the first division in the new classification, comprises four families, *i.e.* Arctiadae, Caradrinidae, Plusiidae, and Oenertiidae. The first of these families embraces the Nycteolidæ, Nolidæ, Lithosiidæ, Euchieliidæ, and Cheloniidæ, of the old arrangement. The second consists of the bulk of the old style Noctuæ. The third comprises Gonopteridæ and Plusiidæ, together with the Acontiidæ, and other families of the old style, up to and including the Toxocampidæ, and also the species generally referred to as Deltoids. The fourth includes our old friends the Liparidæ under a new name, and transferred to a new position.

NOTODONTINA, the second division, is made up of the Geometræ, Cymatophoridæ, Sphingidæ, Notodontidæ, and Saturniidæ (old style). The Geometræ are placed in very different sequence to that we have been so long accustomed to ; a large number of familiar generic names have disappeared, and many of Hübner's have been introduced.

In the third division—LASIOCAMPINA—we have the Drepanidæ, Endromididæ, and Lasiocampidæ. Then follows PAPILIONINA, the order of families being—Nymphalidæ, Satyridæ, Erycinidæ, Lycænidæ, Pieridæ, Papilionidæ, and Hesperiadæ.

Cossidæ (except *Cossus*, which becomes changed into *Trypanus*, and is the sole representative of a family placed at the end of the TORTRICINA), together with Zygænidæ, Cochliopodidæ, and *Psyche* (old style), comprise the sixth division—PSYCHINA—following PYRALADINA.

The Hepialidæ are grouped with Micropterygidæ in the ninth, and last, division—MICROPTERYGINA.

In many respects this new arrangement is certainly a distinct improvement on the old, but as there are rumours that still other new systems of classification are soon to be introduced to our notice, it may be as well to await these before we decide to rearrange our collections.

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[No. 395.]

PERIPLANETA AUSTRALASIÆ AND *P. AMERICANA*.



1. *Periplaneta australasiæ*. 2. *P. americana*. (Vide Note, p. 124.)

THE DRAGONFLY SEASON OF 1895.

By W. J. LUCAS, B.A.

AFTER the long and severe frost that marked the close of the winter of 1894-5, neuropterists were naturally anxious for the new season to commence in order that they might ascertain how the nymphs had fared during the lengthened spell of arctic weather. Now that the season is over, I think it may safely be said that the unprecedented cold had few ill effects on the odonate branch of the order; for, judging from my own experience, the season of 1895 was on the whole a good one; and yet there must have been many cases in which the smaller ponds, that formed the winter home of various nymphs, were entirely frozen up. But perhaps it is at present almost too early to judge, as, seeing that several species take more than one year to reach maturity, we cannot yet say how the smaller fry may have stood the trying ordeal.

Nymph-hunting, which I pursued on one or two occasions only, produced but a single species, *Libellula quadrimaculata*; but these were to be taken in profusion at the Black Pond, near Esher. Amongst them a friend secured one specimen of *Cordulia ænea*, but did not discover his prize till the imago appeared. I had hoped to take the nymph of *Anax formosus*, but, after searching in the right spot, was only rewarded with empty cases, from which the imagines had fled. Numerous shells of what I felt sure must be *Enallagma cyathigerum* were on one occasion to be seen, though I had not been able to find the lurking-place of the nymphs. Indeed, I should scarcely like to ascribe them to that species had I not found above one case an imago that had but just emerged, and whose wings were not yet expanded. The empty case, however, was so colourless and ethereal, that although, I believe, no figure or description has ever been given of it, I have not yet attempted to make either one or the other, but hope to secure this spring living nymphs for the purpose.

On several occasions I observed females, notably of *L. quadrimaculata*, *C. ænea*, *S. scoticum*, and *S. vulgatum*, while poised upon the wing, ovipositing by dipping the abdomen in the water, and on July 29th placed some eggs of the last in a fish-globe. A number duly hatched out, and by Sept. 6th the nymphs, looking like tiny spiders, were a trifle over 1 mm. in length. Their life unfortunately was not a long one, their surrounding probably being unsuitable for them, or their food being insufficient.

A specimen of *Pyrrhosoma minium*, immature, since it had yellow markings, was the first imago to fall to the net, its capture taking place at the Black Pond, near Esher, on May 3rd. This species continued on the wing for about two months, the last specimens being noticed on July 6th. Its congener, *P. tenellum*,

a later, smaller, and less common insect, was just coming on the wing at the Pond on June 9th. It was soon out in swarms, and was secured as late as Sept. 10th, three months after its first appearance.

Enallagma cyathigerum was first noticed on May 8th at the Black Pond, and was still on the wing at the same place on Sept. 29th, nearly five months later. How many broods the specimens belonged to, I cannot say. On more than one occasion I came across this dragonfly caught by the round-leaved sundew (*Drosera rotundifolia*). When found the insects were quite alive, although the tentacles on the leaves had closed over and secured the prisoners by the abdomen. With this insect no specimen of *Agrion puella* was taken, though a few were captured at a tiny pond in the same locality. At Wisley Hut Pond, on the other hand, *A. puella* was present in plenty on July 29th, while but one *E. cyathigerum* was taken.

At the Black Pond, on June 4th, a specimen of *Ischnura elegans* was secured, this being a new record for the locality, where, however, I cannot say definitely that I saw another specimen. The species was out in swarms at Wisley Pond on July 29th; and I am also able to record it for Surrey, at Merton, July 7th; on Wimbledon Common, June 30th; and on Chobham Common, June 16th.

One single specimen of *Platychnemis pennipes*, a well-marked female, turned up at the Black Pond on June 9th, furnishing yet another new record for this prolific locality; but this local insect was secured in larger numbers near Ripley on the 23rd, by which date it was going over.

Lestes sponsa I have only taken at Wisley Pond, where, however, on July 29th, with *Ischnura elegans*, it was on the wing in swarms.

Calopteryx splendens is the only other Agrionine dragonfly whose acquaintance I made during the season. It was out in abundance on June 3rd, between Byfleet and Wisley, and on June 23rd, near Ripley. The males varied greatly in the depth of the blue colouring on the wings.

Of the Libelluline dragonflies, the first to appear was *Libellula quadrimaculata*, on May 8th, at the Black Pond. The specimens on that day were mostly pale and limp, and had apparently but just emerged. They were on the wing till July 6th, after which I was able to record no more. But on Sept. 9th I was surprised to see a specimen, which, however, spite of long and patient waiting, was not secured. As I think it was impossible to mistake the species, I am driven to conclude that it was an autumnal appearance due to the lengthened summer weather. The species was also observed near Byfleet and at Wisley Pond on June 3rd, and at Chobham Common on June 16th.

A limp specimen of *Cordulia aenea* was just out at the Black

Pond on May 26th, while it was extremely plentiful at Byfleet on June 3rd, and was on the wing at Wisley Pond the same day. The last specimens I saw were at the Black Pond on June 9th.

But few specimens of *Platetrum depressum* came under my notice last season, but I observed it near Esher on June 2nd, near Byfleet on June 3rd, and near Ripley on June 23rd.

Seven specimens of the none too common species, *Brachytron pratense*, were secured near Byfleet and at Wisley Pond on one occasion only, June 3rd.

Anax formosus, the finest of our dragonflies, first put in an appearance at the Black Pond on June 2nd, but was not secured till the 4th, when three females, two of which fell to the net, were disturbed in dull weather from a small ditch on Esher Common. I last noticed the species on July 6th. In 1895 it was secured more than a month later, on Aug. 10th. Chobham Common is another Surrey locality, where it was on the wing last season on June 16th.

Of the genus *Sympetrum*, the commonest two species, *S. scoticum* and *S. vulgatum*, often crossed my path. The former was first noticed on the wing on July 27th, at the Black Pond, and was still out in good numbers on Sept. 29th. Of the other species, *S. vulgatum*, one was taken near the Black Pond on June 30th, but I did not take another till July 29th. This species also continued on the wing till Sept. 29th.

Three species only of the grand genus *Æschna* fell to my lot last season. *Æ. grandis* was first sighted on June 23rd, and was about in most places I visited till Sept. 10th. *Æ. cyanea* began to appear about July 1st, while my last capture was made on Sept. 15th. I saw one at least, however, as late as Sept. 29th. A much scarcer insect than the two already noticed—*Æ. juncea*—which closely resembles *Æ. cyanea*, but may easily be distinguished from it, amongst other means, by the long pterostigma, was first certainly seen on Aug. 15th in Talbot Woods, near Bournemouth, when, strange to say, a female was taken paired with a male *Æ. cyanea*. A male was secured on Sept. 7th at Wisley Hut Pond, and another on Sept. 9th at the Black Pond, where also others were seen till the end of the month; but so wary were they that no further specimens were secured.

It will be noticed that most of my collecting was done in Surrey. During a visit to Oxford in August I saw, on the 8th, a few specimens of what, I take it, were *S. vulgatum* flying over a pond at Dry Sandford; but besides saw no species except *Æ. cyanea* and *Æ. grandis*, which, however, were plentiful, especially near Bagley Wood. A specimen that I took to belong to the latter species was noticed hunting on Aug. 1st, at 8 p.m. and one on Aug. 8th, at 7.45 a.m.

During a visit to Somerset, from Aug. 26th to Sept. 6th, in which a good deal of ground was covered, dragonflies were noticed

on two occasions only. A single *Æ. cyanea* was seen and captured near Sparkford on Aug. 27th, and a small number of *S. vulgatum*, of which one was captured, were found flying on Sept. 2nd over a piece of swampy ground near the coast, a mile or two from Bridport.

21, Knight's Park, Kingston-on-Thames, Feb. 3rd, 1896.

METEOROLOGICAL AND OTHER CONDITIONS INFLUENCING THE APPEARANCE OF MOTHS.

By B. N. MENSshootkin.

I SHOULD like to bring forward some notes respecting the question of the nightly appearance of moths, and how it is influenced by meteorological conditions. These conditions can be divided into—(a) common, which may be applied to a greater number of species; and (b) particular, applying to some, or even only one, species.

The best possible time for moths appearing is, according to observations, a few hours preceding a heavy night thunderstorm. The moths are then literally swarming, and come in hundreds to the sugar. Even rain for a long time does not drive them away; neither do they seem to mind the lightning and thunder.

Warm nights are almost always productive, especially in the spring and early summer; the same can be said if the evening and night are warmer than the day. But towards the middle of the summer warm nights often prove a failure. I attribute this to the fact that moths, as it seems, do not like very dry evenings; and warm nights of the middle and the end of summer are always dry. Neither do they appreciate very wet (but not rainy) evenings; for instance, on evenings with heavy dew, or after a heavy rain, collecting had better be put aside, as no moths appear, with the exception of some mentioned below. But a rainy evening is generally very productive, especially if the temperature is high enough (some 14° to 15° Celsius), and the rain is not falling very fast. Such evenings are sometimes more productive than warm weather. The worst possible evenings I have observed in cases of heavy wet fog, the result of abundant rain during the daytime. Thus it will be seen that wet evenings are not always unproductive, and, provided it rains only a little, and the air is not cold, some nice captures may be effected.

The influence of wind is marked enough, and can be formulated thus: the harder it blows, the fewer are the captures. However, up to a certain degree, the influence of wind may be obviated by putting the sugar on places protected from it. Clear and cloudy nights are also almost always marked: on clear nights

it is colder, and the moths therefore fewer; on clear nights, too, the dew is generally very heavy. The opposite can be said about cloudy nights; but cold cloudy nights seldom give good results.

The foregoing is a brief summary of the general rules applicable to most moths. The exceptions are not very numerous: I will only mention a few, just to show the character of them. Thus, *Hadena strigilis* appears invariably in greater force on fair, clear, cold and wet evenings; this moth has, apparently, a great predilection for sugar, and is the first to come to it, sometimes when the sun has not even set. All the different species of *Catocala*, *fraxini*, *nupta*, *pacta*, the rarer *C. sponsa* and *promissa*, and the very rare *C. adultera*, *Amphipyra tragopogonis*, *A. perflua* and *A. pyramidea*, and some of the species of the genus *Cidaria*—*truncata*, *vespertaria*, and others—prefer cold nights to the warm ones. The genus *Amphipyra* especially likes the wet, cold nights. If this can be explained by the fact that the Noctuæ in question have a thick covering of hair on the body, the explanation is quite inapplicable to *Cidaria*. Then I cannot pass in silence the class of moths which can be called indifferent, that is, appearing every evening and wholly disregarding the condition of weather. As typical specimens of these moths I shall name *Agrotis brunnea* and *A. plecta*.

The other conditions, not relating to weather, may be briefly called: time of appearance, and food.

First of these, time, may be expressed as follows: each moth has a certain hour of the night when it appears on sugar or elsewhere. This time is influenced by meteorological conditions of the night; for instance, it is retarded by cold, dew, or clear sky, and accelerated by clouds or rain.

Food is, I suppose, one of the most important matters to a moth. As a rule, they prefer natural food to sugar; but this is not always the case. A most prominent exception occurs every year with us: it is the blooming of lilacs. Although some moths visit these flowers, the sugar is, at the same time, a very great attraction, as shown by the numbers that come to it; yet the flowers of the lilac contain honey, and by day they are very assiduously visited by bees; even *Macroglossa fuciformis* and *M. bombyliformis* are often seen at them. Quite the opposite occurs every year in July, when the lime-trees are blooming; then not a single moth comes to the treacle, but you can see them flying in the upper regions of lime-trees, quite out of reach even of the longest net.

As regards the kind of treacle for use, I have tried about fifteen different compositions, and I have found that the best is simply a mixture of equal parts of beer and molasses; the addition of rum does not influence the results. The best results are obtained by putting the treacle on tree-trunks with a brush, as in England; the German method—hanging up slices of dried

apples covered with treacle—failed absolutely; inferior, also, were the results of my own method—putting the treacle on the leaves of trees; true, the moths were attracted by it in great numbers; but if in taking the first the leaf was set swinging, the others were sure to fly away or fall down before attention could be given to them.

Taking into account the above, it is possible to foretell in some measure the chances of success or failure on a given evening, which in some cases it is important to know beforehand.

St. Petersburg University, Jan. 15th, 1896.

NEW EXPERIMENTS ON THE SEASONAL DIMORPHISM OF LEPIDOPTERA.

BY DR. AUGUST WEISMANN.

(Translated from the German by W. E. NICHOLSON, F.E.S.)

(Continued from p. 80.)

Third experiment with bryoniæ. — On June 19th, 1888, I again received captured females of *bryoniæ*, despatched by the kindness of Pastor Hauri at Davos, 22 of which arrived alive. From June 25th onwards they laid eggs on rape, and the larvæ emerged between June 26th and July 1st. They were reared on plants kept in water in a room at 17–23° C., and were divided into two lots on July 25th.

Lot I., distinguished as Experiment III.*a*, was left until pupation took place in the breeding-cage at the summer room temperature (always very warm). Pupation took place between July 20th and 28th. Although the room temperature in August was still about 20° C., yet no specimen emerged; all the pupæ were hybernated in a warm room, and produced nine completely normal butterflies in the spring of 1889, 3 males and 6 females, *viz.* 1 male on March 23rd and April 15th and 18th, and 1 female on April 29th and May 25th, and 2 females on May 27th.

Lot II., distinguished as Experiment III.*b*, was taken, on July 25th, 1888, from the room temperature at 23·8° C. into the incubator at 30° C., and remained there until Aug. 19th. Pupation took place about the same time as with lot I., namely, between July 20th and 28th. Although the temperature of the incubator never sank below 25° C., and was generally at 29° C., frequently also 31°, and once 32·8° C., yet no specimen emerged. From Aug. 19th onwards the pupæ were again kept in the room temperature, and during the winter in a cold room.

The emergence of 32 butterflies, 23 males and 9 females, first took place in the spring of 1889, *viz.* :—

6 males and 3 females on May 23rd, 1889.
9 males and 3 females on May 25th, 1889.
7 males and 3 females on May 26th, 1889.
1 male on June 7th, 1889.

These specimens also are all completely normal; some of the females are brighter, others more darkly powdered, but all have the usual yellowish ground colour, such as the specimens captured at large exhibit. There is no difference between the specimens of lots I. and II., and consequently the warmth of the incubator was entirely without influence on all these specimens. *Only one male differed from all the rest, and he indeed emerged very late, on July 7th; as this specimen resembles in almost every respect specimens of the summer form of napi, only the tips of the wings are a little darker than with these.*

Fourth experiment with bryoniæ. — In June, 1889, also I received once more a consignment of living females of *bryoniæ*, through the kindness of Pastor Hauri at Davos, and again succeeded in inducing them to lay eggs. The young larvæ began to emerge on June 23rd, and I brought them, on their food-plant, the rape, into the heated incubator, especially constructed for rearing larvæ, at 26–31° C. The rearing was going on satisfactorily; just before pupation, however, the fungoid disease appeared which is often so destructive to our *Pieris* larvæ, and which had already interrupted by its ravages my experiments with *bryoniæ* in the seventies. About 30 larvæ died immediately from it; others, indeed, pupated, but then died. The solitary butterfly which I reared on July 7th almost completely resembled an ordinary summer female of *P. napi* var. *napæ*, and principally differed from that in the tip of the fore wing being grey instead of black, and by the black powdering of the veins 1 to 4 of the hind wing on the under side towards the margin of the wing. The latter occurs otherwise only in the winter brood of *P. napi*, and is especially strongly pronounced with *bryoniæ*.

The fungus epidemic owed, indeed, its destructive power principally to very damp, and at the same time warm, air in the incubator. Unfortunately, I could not repeat the experiment during the year 1889; otherwise I should have tried to reduce the dampness of the air, which cannot be entirely dispensed with, to a minimum; at the same time also to rear the larvæ at the ordinary summer temperature, and to first subject the pupæ or the larvæ about to pupate to the heat of the incubator.

Results of the experiments with bryoniæ. — The results of the experiments here described differ in one point from the experiments described in the year 1871, in so far as that not one of the pupæ then kept at 15–30° C. emerged as *napi*; while in each of the new Experiments, II., III. b, and IV., one butterfly was very

similar to the summer form of *napi*. Had this case only occurred once, it might have been thought that an egg of *P. napi*, or a quite young larva, had been accidentally introduced into the experiment with the food-plant. I cannot declare it absolutely impossible, notwithstanding careful searchings of the food; but I do consider it very improbable, since the introduction of an egg must have taken place the first day of the rearing, otherwise the larva of *napi* would be far behind the brood of *bryoniæ* in development; but on the first day the quantity of food is so small, that the oversight of an egg or a young larva on it is scarcely conceivable.

But it may yet be added, that one of the pupæ of Experiment II. forced in the incubator exhibited a sprinkling of the wings with white, which may be interpreted as a partial reversion to the *napi*-form. This would contradict my view given in 1871, which regarded the form *bryoniæ* as the original parent form of *napi*. It is obvious that it is a very old form from its wide distribution—in the high Alps and in the far north; but we must, indeed, withhold the final cause, until numerous further extensive experiments are before us. If possible falsification of the experiments is disregarded, the *quite isolated napi*-forms which arose cannot be explained otherwise than by reversion. The white-sprinkled female of *bryoniæ* might be a hermaphrodite, similar to the hermaphrodite bees, in which the male and female characters sometimes appear intermixed in a wild state. Unfortunately this view can no longer be decided by anatomical examination, as the butterfly is dry. But the *napi*-like males might have their origin in an earlier crossing which once took place between a *bryoniæ* female and a *napi* male, and therefore exhibit no variation from *napi*. A mixture of both forms is not entirely impossible, although in general they fly separated both as regards time and place; but there certainly are many places, in which they overlap one another in both aspects.* But if this was the cause of these isolated specimens of *napi* in my experiments, the same would have arisen without the operation of an abnormally high temperature—so it may be thought. The question is obviously not ripe for decision; further experiments with larger numbers of individuals must be undertaken, and attention must be specially directed to this point.

III. EXPERIMENTS WITH VANESSA LEVANA-PRORSA.

Since the publication of a series of experiments with this species in the year 1871, I have again repeatedly experimented with it, whenever the material was available. Before everything the point with me was to test the results I had already obtained

* Thus Meyer-Dürr cites the neighbourhood of Meyringen as a place in which an exactly intermediate form between *napi* and *bryoniæ* occurs.

by more exhaustive and, where possible, more accurate experiments. After the conclusion of these I first came to regard the seasonal dimorphism of many butterflies, and so also, hypothetically at least, that of *prorsa-levana*, not (as hitherto) as the direct effect of the differences of temperature, but as adaptive-dimorphism, the two schemes of development of which are only connected with different temperatures as the excitants which set them free (Auslösungsreize). If the experiments afford confirmation of this view, they may be regarded as unbiased testimony for the accuracy of it.

First experiment with levana, 1883-84.—Numerous (far over 100) eggs and young larvæ of the second brood were collected on Aug. 8th, and reared at the ordinary temperature. Pupation took place at the beginning of September. The pupæ were kept in a heated room, and one *prorsa* emerged there.

From Jan. 10th, 1884, onwards, the pupæ were kept in the incubator over water at 27-30° C. The regulation of the incubator was, however, not quite suitable, and the temperature occasionally rose too high. Many pupæ therefore died, and many butterflies emerged crippled. I bred:—

On Jan. 18th,	5 <i>levana</i>	} All are without the blue marginal lines of the hind wings.
„ 19th,	6 „	
„ 20th,	2 „	
„ 21st,	3 „	
„ 22nd,	2 „	
„ 23rd,	3 „	
„ 24th,	1 <i>porima</i>	
„ 25th,	10 <i>levana</i>	
„ 26th,	1 „	
„ 29th,	1 „	

—
34 butterflies.

Out of these 34 specimens only 15 were developed quite perfectly; 19 had more or less crumpled and crippled wings, but so that the colour and marking can be recognised. The frequent crippling is doubtless to be referred to the very damp air of the incubator, which moistens the pupal integuments and makes them soft, and thus renders emergence difficult. In order to prevent this, the pupæ were taken out of the incubator on March 1st, and placed in a warm room, which was unheated later on. However, only one more emerged, *viz.* :—

On May 24th, 1 pure *levana* female.

Second experiment with levana, 1884-85.—It should be decided, whether hybernated pupæ can be forced to assume the *prorsa*-form instead of the *levana*-form by artificially withholding their development until the summer, *i.e.* until the

normal time of flight of the *prorsa*-form. Pupæ of the second brood of 1884, which had pupated at the end of August and the beginning of September, were therefore hybernated in a cold room, and then, at the beginning of the spring, on March 1st, brought into the refrigerator at $+5^{\circ}\text{C}$., and there left until June 27th, when they were brought into a room. There emerged :—

On July 8th, 6 *levana*.

July 10th, 3 *levana*.

Among these there were, however, two specimens, which by the greater extent of the black on the upper side exhibited an approach, though a slight one, to *porima*. The temperature of the room during the development was generally a high summer heat, $22\text{--}30^{\circ}\text{C}$.; it was colder on July 2nd only, viz. 18.7°C .

Third experiment with levana, 1886.—It was to be ascertained, whether the second brood, which usually hybernates, could be forced by warmth to emerge in a shorter time, and to assume the *prorsa*-form.

Eggs and young larvæ of this brood, collected in the open on July 29th, were reared in the incubator at $30\text{--}32^{\circ}\text{C}$. Many pupated as soon as Aug. 8th, the others somewhat later. The pupæ remained in the incubator at $30\text{--}32^{\circ}\text{C}$. There emerged :—

On Aug. 15th, 2 pure *prorsa*.

„ 16th, 2 „ „

„ 17th, 2 „ „

„ 18th, 2 „ „

—

8 pure *prorsa*.

The majority of which, however, were hindered in unfolding their wings by the great humidity, and thereby more or less crippled. In addition, several larvæ had come out of the incubator, and had pupated about the room. These also produced :—

On Aug. 19th, 5 pure *prorsa*.

„ 24th, 1 „ „

„ 26th, 1 „ „

So that consequently 15 *prorsa* were reared altogether.

Unfortunately the further question, whether by a high enough temperature all individuals can be forced to assume the summer form and to emerge forthwith, is not decided in this experiment, as the remaining pupæ (about 50) were dead.

Fourth experiment with levana, 1886. — Eggs and young larvæ of the second brood, found in the open on July 29th, were reared at an ordinary room temperature, and pupated at $21\text{--}22^{\circ}\text{C}$. between Aug. 17th and 22nd. Out of 241 pupæ there emerged in the same summer, between Aug. 25th and 28th, 5 *prorsa*. The remaining 236 pupæ, as an emergence was no

longer to be expected under normal conditions, were divided into two lots in October.

Lot A.—150 pupæ were kept in the incubator at a temperature of about 27° C., which was, as far as possible, constant; there they frequently moved themselves vigorously, which they had never previously done at the room temperature of 13° C. Such movements were observed up to Jan. 14th, 1887, but not later. Up to then no butterfly emerged, and the examination of the pupæ on March 2nd showed that they were all dead and putrid.

Lot B.—86 pupæ were kept over water at the room temperature, which in November, December, and January was not above 13–14° C. There emerged, however:—

On Feb.	16th, 1887,	1 male,	<i>levana</i> .
„	19th, „	2 males,	„
„	23rd, „	1 male,	„
„	23rd, „	1 female,	„
„	24th, „	3 males,	„
„	28th, „	2 males, 1 female,	<i>levana</i> (1 crippled).
On March	6th, „	2 males, 1 female,	„
„	7th, „	1 female,	„
„	8th, „	1 male,	„
„	9th, „	2 females,	„
„	10th, „	2 females,	„
„	12th, „	1 male,	„
„	13th, „	1 female,	„
„	15th, „	2 males,	„
„	17th, „	1 male, 1 female,	„
„	20th, „	2 females, 1 male,	„
„	21st, „	1 male,	„
„	22nd, „	2 males,	„
„	25th, „	1 male,	„
On April	4th, „	1 male,	„

34 *levana*, 22 males, 12 females.

Fifth experiment with levana, 1886. — Young larvæ of the second brood, found in the open air on Aug. 16th, were reared in the incubator at 30–31° C.; from Aug. 29th the temperature was kept at 27–28° C. Pupation took place from Aug. 24th onwards. The pupæ remained in the incubator, and there emerged there, from Sept. 1st to 7th, 56 *prorsa* (some of them with a good deal of yellow), but no actual *porima*.

Sixth experiment with levana.—Half-grown larvæ, found on Aug. 16th, were treated in the same way, *i.e.* first kept in the incubator at 30–31° C., and later on at 27–28° C. Pupation took place between Aug. 20th and 27th, and there emerged, between Aug. 30th and Sept. 4th, 14 *prorsa* (three of them with much yellow), but no true *porima*.

Seventh experiment with levana, 1886.—Older larvæ, found on Aug. 16th, were treated as in the fifth and sixth experiments, that is to say, reared in the incubator at 27–31° C. They pupated between Aug. 21st and 23rd. The excessively damp atmosphere of the incubator, which was not constructed quite suitably, unfortunately killed all the pupæ; three larvæ, however, escaped and pupated in the room, and these produced, from Sept. 6th to 10th, three *prorsa*, with little yellow.

Digest and conclusion of the levana experiments 5, 6, and 7.—73 *prorsa* butterflies were bred in consequence of rearing larvæ of the third brood in the incubator. In the fifth and sixth experiments the pupæ kept alive without emerging. These were kept through the winter at a room temperature of 13–14° C., and produced :—

On Feb.	9th, 1887,	2	<i>levana</i>	males.
„	10th, „	1	„	female.
„	16th, „	1	„	female.
„	28th, „	3	„	
On March 1st,	„	1	„	male.

8 *levana*.

Results of the levana experiments. — All the experiments newly described here relate to the *third brood of the butterfly*, i. e. to the brood of the summer generation, or the second brood of the year, which usually hibernates and produces the “winter form” *levana* in the spring. The species is double-brooded with us, and the larvæ of the late summer brood usually forms the first brood of the butterfly of the following year. My experiments of the year 1869 have shown that very occasionally in very hot summers this late summer brood of larvæ manages to pupate and emerge, and, in Southern Germany, at least, to lay eggs, although it has not been proved by them that these eggs can develop to pupation; so that a complete third brood can be interpolated in the cycle of the species.

The experiments then carried out appear to me to prove, that the *prorsa*-form can well be changed into the *levana*-form, if the pupæ are brought into the cold; but, on the other hand, that application of heat to the pupæ does not succeed in altering the *levana* brood into the *prorsa*-form. I thereupon concluded, that the *levana*-form was the older, the *prorsa*-form the younger. At that time I was working at heredity with conceptions that were not yet very clear, and thought “reversion” to the parent form might, indeed, be possible, but reversion from the parent form to the phyletically younger form is not conceivable. A theory of heredity was then wanting, to which such facts could be referred and subsumed under general propositions. To-day, where I assume different rudiments to each of the two forms of the

butterfly in the germ of the individual, I should no longer have fallen into this confusion. Then I pictured to myself a cycle in such a way, that one and the same germ-substance was so governed, that it must one time produce *levana*, and the second time *prorsa*, then again *levana* and again *prorsa*. To-day I imagine two kinds of rudiments in the germ near one another, one of which is enabled to develop by heat and the other by cold. Now it is no longer a difficulty, that, according to circumstances, from one brood of *prorsa* yet another brood of *prorsa* follows, as I already had shown, that by the influence of cold upon the pupæ, one brood of *levana* could be followed by a second brood of *levana*. In my view, the conception of "reversion" no longer in general plays any part in these phenomena, but only that of the activity of one rudiment or the other.

The facts harmonise very well with this view of cyclic heredity, although they also show, that the phenomena are not quite so simple, as might be expected from it. This depends upon the fact, that the temperature is not the only excitant, but that rather some other co-operates with it: the tendency to alternation.

For the rest, I had already been able, from my old experiments with *levana*, to draw the conclusion that the change of form is a relatively free one, as in one of the same (Experiment 6) I succeeded in getting a female of the summer form *prorsa* to reproduce, and indeed, in the hot summer of 1869, very early indeed—on July 4th. The butterflies (18 specimens) developed from the eggs after 30–31 days, and these were all the *prorsa*-form. One of my critics rightly cited this against me at the time.

It is obvious, from the experiments now set forth, that in fact the third broods can be induced by heat to assume the *prorsa*-form, at least in part; indeed, that an especially high temperature is not always necessary for isolated *prorsa*-forms to arise. This is proved by:—

The first experiment, in which, from about 60 pupæ of the third brood, which had pupated at the beginning of September at the usual temperature of a warm room, one *prorsa*, at least, still developed.

The third experiment, in which, from numerous specimens, which pupated in August (consequently very early), 15 *prorsa* butterflies emerged up to the end of August.

The fourth experiment, in which, from 241 pupæ of the third brood, five *prorsa* emerged at the end of August at the usual room temperature.

The fifth experiment, in which, from pupæ of the third brood, 56 *prorsa* butterflies emerged at the incubator temperature of 27–28° C. at the beginning of September.

The sixth experiment, in which, from pupæ of the third brood at 27–28° C., 14 *prorsa* emerged.

The seventh experiment, in which, from pupæ of the third brood at the room temperature, three *prorsa* emerged at the beginning of September.

But one dare not assume from these experiments that every pupa of the third brood assumes the *prorsa*-form, in case it is brought into a high temperature on its pupation. The following facts speak to the contrary :—

In the first experiment only one *prorsa* emerged from about 60 pupæ, which were all kept at the same temperature, *i.e.* in a warmed room. In the third experiment only eight *prorsa* emerged in the incubator out of 65 pupæ, but there were besides seven *prorsa* of the same brood, which had pupated in the room. In the fourth experiment I bred five *prorsa* butterflies out of 241 pupæ at the ordinary temperature at the end of August ; all the rest hibernated.

These facts admit of no other explanation, as it appears to me, than the assumption, that *the tendency of the pupæ to the development of the prorsa-form is of different strength with the different individuals* of this third brood. It might be objected to this conclusion, that the temperature of the incubator was fluctuating, and that the different individuals might have been subjected to unequal temperatures just at that period of development in which the decision is given, whether the *prorsa* or *levana* rudiment is to be active. On the other hand, it is proved by Experiments 5 and 6, in both of which the temperature only fluctuated very slightly, and in which it is equally certain, that the critical time of this high temperature was struck while the larvæ had been reared in the heat, and pupation took place in the incubator itself. Yet in both experiments together 35 pupæ hibernated uninfluenced by the heat, and eight of them produced the *levana*-form in the spring.

This conclusion of the different individual tendency towards the assumption of the summer form might be contrasted with my experiment of the year 1869 ; since then all the pupæ of the third brood assumed the summer form under the influence of the exceptionally hot July sun. But first there were only 18 specimens ; secondly, there were five *porima* among them, *i.e.* intermediate forms between *levana* and *prorsa* ; and thirdly, it is still indeed dependent on the strength and duration of the warmth excitant whether the *prorsa* rudiment is active ; and it is conceivable that, with very great heat, such as then prevailed, this is always the case. Such a high temperature as a hot summer brings about in the open, cannot be produced artificially, without running the risk of destroying the pupæ by an atmosphere which is too dry or too damp, or by the prevalence of vegetable parasites. After all it is never to be forgotten that we

cannot produce the *natural* conditions artificially in the incubator; the change between day and night temperature is not to be closely imitated, and still less the wind, &c., or indeed the direct rays of the sun, which also come into consideration.

I consequently believe we may assume, that in fact the third brood of *levana-prorsa*, as a general rule, has the tendency to longer pupal rest (*i. e.* to hybernation), and with it to the *levana*-form; but that this is not the case with all the brood, single individuals in many broods being constantly present, which, on the other hand, bear in themselves the tendency to rapid development and to the assumption of the *prorsa*-form. These are the individuals which still produce *prorsa* butterflies at a medium temperature (at about 13–18° C.) in September or October. But manifestly we must conclude, that a larger number of pupæ of this third brood is altered by the higher temperature, and may be induced to develop forthwith under the assumption of the *prorsa*-form. Whether there are also such individuals, which are in no way to be induced to this, must for the present remain undecided; the five *porima* specimens of the experiment of 1869 prove that with many it only takes place with great difficulty, as in these both germ-rudiments (Keimesanlagen), the *prorsa* and the *levana* rudiment, have worked together.

But such a co-operation can, as the experiments teach us, take place in yet another way. In the first place it is significant, that specimens of *porima* sometimes occur also in the open, and, indeed, in the summer. If I am not mistaken, they can be brought about in two ways: either as in the experiment of 1869, *i. e.* by the fact that an unusually hot summer allowed the third brood to begin very early (commencement of July), so that their pupæ fell under the influence of the greatest summer heat. In this case those individuals will become *porima*, in which the tendency to *levana* is overcome by the heat with most difficulty. But the *porima*-form can, indeed, arise in yet another way—in which they were first artificially produced by Dorfmeister, and later on by myself, namely, by the action of a lower temperature on the second brood. In this a preponderance of the tendency to the *prorsa*-form will have to be assumed, but one which can be more or less completely overcome by the fact that a low temperature is acting at the critical time, *i. e.* immediately after pupation.

It seems obvious from the experiments, that a certain influence can still be always exercised by temperature on the colouring of the butterfly, even in the later period of the development of the pupa. Experiment 2 shows, at least, that pupæ of the third brood of the end of August and beginning of September, which not only spent the winter in the cold, but were also prevented from further development the whole of the spring by means of cold, produced, indeed, the *levana*-form in

July, but yet in some specimens with a slight approach to *porima*. At all events, a high temperature itself has, as a rule, very little effect on pupæ of the third brood, which have once been exposed to it for some weeks without developing. They all produce the *levana*-form, although frequently tending somewhat towards *porima*; in this way the 34 butterflies of Experiment 1 emerged, which were forced by heat as soon as the end of January.

Viewed apart from any theory, the facts, shortly put together, are the following: *levana* and *prorsa* follow one another in the open with us in a regular cycle in such a way that, as has been known for a long time, *levana* occurs in April, *prorsa* in June. By the influence of cold immediately after pupation the second brood may be induced to assume more or less the form of the first, *i.e.* the *levana*-form; but the tendency to the *prorsa*-form is stronger in this brood, and it does not succeed in making every individual *levana*. On the other hand, the third brood has, in the greater number of individuals, a strong tendency towards hybernation and to the *levana*-form. But there are single individuals, which form *prorsa* at once without the influence of a higher temperature, and the majority of the rest can be induced to become more or less pure *prorsa* by the influence of a high temperature on the fresh pupæ. Intermediate forms, so called *porima*, arise, wherever a brood is affected by an unsuitable temperature at the beginning of its pupal period; thus with the second brood by unusual cold, with the third by unusual heat.

I shall speak of the theoretic significance of these facts in the general part.

(To be continued.)

PLUSIA FESTUCÆ AND ITS SECOND BROOD.

By J. ARKLE.

On a hot sunny afternoon, May 6th, 1893, whilst watching a number of dragonflies (*Ischnura elegans*) flying about or resting upon the sedge *Glyceria aquatica*, my attention was arrested by a small hammock of white silk slung up near the bent top of a sedge leaf. I had never seen such a thing before, but I felt sure it was a cocoon of *P. festucæ*. And so it was. The dragonflies were left to themselves, and at the end of a close search I had taken six pupæ. The moths all emerged between June 5th and 10th.

Although I kept a sharp look on the place, I saw no further trace of the insect until Aug. 3rd, when I found seven pupæ spun up about twenty yards from where I took the first. Three moths emerged on the 7th, two on the 16th, and another on the 18th.

The seventh pupa died. Newman states that the chrysalis occurs in August. Stainton gives August and September as the months for the imago.

May, 1894, was cold, wet, with little sunshine, and frosty towards the end of the month. It was June 6th before I saw *P. festucae*. On that day I found a larva spinning up at the old place on an iris leaf. On the 13th I took six pupæ, and on the 20th one. The first emergence occurred on the 29th, three more July 1st, and the eighth on July 5th. The second brood of this year had spun up by Aug. 18th, when I found three cocoons on the mace or branched bur-reed (*Sparganium ramosum*). On the 24th I took three more cocoons from the same species of sedge. On the 27th I found two pupæ, and a caterpillar in the act of spinning its cocoon. One of these pupæ was upon *S. ramosum*, and the caterpillar on *G. aquatica*. I gave away all this second brood, with the exception of two pupæ I reserved as tests. The first of the two produced a moth Aug. 29th, the second on Sept. 1st; and those sent away gave a satisfactory account of themselves about the same time.

January and February, 1895, are still remembered for their intense frosts. On Feb. 10th I happened to be near the *festucae* pond, and went a little out of my way to see how it looked. It was obliterated. Instead was a large sheet of ice stretching well on to a quarter of a mile. The greater included the less. A lot of people were sliding and skating on its surface. A waterhen's nest, which I had previously noticed, had disappeared, in what, I was told, had been an exceptional flood.

It was near the end of April before the waters had retreated and left the pond at its normal size. Then came the wonder as to whether I should find the first brood of *P. festucae*. I searched again and again, but without success. Pupæ were found at other spots in the district, and the question now was how long it would be before a moth visited the old pond again. I had not long to wait. On Aug. 7th I took three pupæ, and two larvæ spinning up; on the 9th, two more larvæ just beginning their cocoons; another pupa on Aug. 15th—all on *S. ramosum*. On the 20th the first moth appeared, and on the same day I discovered a pupa on iris. The last moth emerged from its cocoon on Sept. 7th.

To get a connected series of tests I have referred only to observations relative to this particular pond. I have never been able to find the caterpillar except when making its cocoon, and I have never seen the perfect insect anywhere out of doors, except on one occasion. The chrysalis is black.

The foregoing facts prove *P. festucae* to be double-brooded in the Chester district; and I am able to show, through the kind favour of Mr. J. Collins, that this feature in the life-history of the insect is maintained as far north as Warrington. Mr.

Collins's note to me on the subject is so interesting that I avail myself of the privilege of giving it *in extenso*. He says:—"We do take the second brood of *Plusia festucæ* at Warrington, as well as the first one. In June last I found about half a dozen webs containing pupæ, and have long since [his letter is dated Sept. 2nd, 1894] bred the moths from these, of course. I have not had the time to search for the second brood, last August, or even up to date, as I am aware it is not yet too late to go for it. Like you, I take mine on the great sedge, bur-reeds, also on a coarse ribbon-grass, and have actually found them feeding on water plantain (*Alisma plantago*), but never on yellow iris. I have found cocoons repeatedly on water plantain, and on the coarse grass referred to, growing in the middle and along the sides of a little brooklet near Warrington. By the way, when the cocoon is spun on the grass it is bad to detect. From the nature of the locality we always fancy a dry season like last year essential to their welfare; for in the wet seasons the streams rise, overflow the banks, wash down the plants, and consequently swill off and drown the larvæ. However, yours may be obtained from ponds where they would be less exposed to drowning, from there being no current to bring down the plants. We always find in a wet season that *P. festucæ* is much scarcer than in a dry one. I have for many years netted the June brood over campion and bramble flowers."

Following an observation of mine upon the habits of the moth (Entom. xxvii. 243), Mr. J. E. R. Allen, of Bolton, contributes (p. 270) an interesting note on the appearance of the insect in Galway. There, in 1893, he took an imago May 28th, and another on Sept. 20th. Obviously these were representatives of first and second broods.

Let us now consider the evidence which points to the limit of the moth, at any rate in one locality, to a single brood. Mr. Allen, in the note referred to, says:—"This moth seems to vary in its economy in different localities. At Bolton, where I have taken it for many years, half-grown larvæ are found in April, and full-grown larvæ up to the middle of June; the food-plant is almost always the yellow iris. The pupa is generally in a bend of the iris leaf, about two inches from the point, and the moths begin to emerge at the end of June. I do not think a second brood occurs at Bolton; I and others have looked for it in vain." Mr. Rushton, of Thornbank, near Bolton, in a letter to me dated Aug. 30th, 1894, says:—"I am sorry to say that I know very little of the life-history of *P. festucæ*. I had three pupæ. Two emerged on July 4th, and the other on July 5th." Mr. Rushton, in another letter dated Sept. 3rd, supplies me with a note by Mr. J. Grime, of Bolton. Mr. Grime says:—" *P. festucæ* occurs in three localities about Bolton. In forward seasons I have found the chrysalis by May 18th, but never earlier. It is in the

chrysalis state about four or five weeks, and I believe the young larvæ hibernate. Although I have searched repeatedly for a second brood, I have never found one."

We have now got from Chester to Warrington, twenty miles, roughly speaking, and north-east. From Warrington to Bolton is another twenty miles, measuring by the same standard of accuracy. Here, although search has been made for years, and by careful entomologists, the late brood has never yet been found. Let us continue our trip some forty miles to the north-west, and we find Mr. G. T. Porritt at Morecambe from Aug. 11th to Aug. 31st, 1893. In Ent. Mo. Mag. for January, 1894 (p. 12), we find Mr. Porritt writing as follows:—"At dusk *P. festucae* occurred on all the ditches (Heysham Moss), and was not uncommon." What, then, was *P. festucae* doing at Bolton at the same time—forty miles to the south? It was either on the wing as well, as a second brood, or the progeny of the *only brood* (June-July) were about to hibernate as eggs or larvæ. The first of the three probabilities must be dismissed in the face of evidence which cannot be set aside, and either the second or third brings the Bolton form up to the importance of a variety. As far as coloration is concerned, variation of the moth is hardly perceptible. The Chester insect, I think, is a little darker than the Bolton one. The "gold spots" vary a little in shape, size, and proximity in all localities, but I can meet with no confirmation of a reputed form with confluent spots.

Chester, Dec. 28th, 1895.

IRRORHOTIDES: A NEW GENUS OF ATEUCHIDÆ, WITH A DESCRIPTION OF A NEW SPECIES.

By JOHN W. SHIPP.

IRRORHOTIDES, n. g.

BODY similar to *Actinophorus*. Thorax and head resembling *Pachysoma*. Fore legs similar to *Sebasteos*. Head not free; clypeus 6-dentate, the two centre teeth projecting. Thorax wider than the elytra, compressed transversely, with the lateral margins strongly curved and crenulate, wider in the centre, narrower at the anterior and posterior angles: apical margin smooth; posterior margin finely crenulate, with a concave curve, and slightly sinuated, posterior angles not so wide as the anterior angles, acute, and terminating in a small tubercle or spine. Elytra cordiform, slightly convex, as wide as long, humeral angles acute; lateral margins curved towards apex, strongly emarginate; basal emargination crenulate. Pygidium obtusely triangular. Anterior tibiæ flat, elongate, 4-dentate on

exterior margin, curved inwards at extremity, with four small equidistant points or tubercles on the inner margin. Femora of a uniform thickness, and not perceptibly thickened towards base. Intermediate femora thickened in the centre; tibiæ short, terminated in a sharp curved spine. Posterior femora thickened in the centre; tibiæ rather long, narrow, and slender, more or less three-sided, obliquely truncate at apex, terminating in a sharp curved spur. Tarsi similar to *Actinophorus*. Prosternal keel ending in an obtuse point; sternum with a deep sharply defined depression down the whole length from the prosternal keel.

FRYII, n. sp.

Colour dull black. Head wider than long, 6-dentate, with the two centre teeth prominent, and the indentation circular; the remaining teeth are almost obsolete. Clypeus smooth, slightly curved upwards in front, covered with very small and fine punctures; occipital ridges very small, and not produced towards the centre of the head; margins smooth. Antennæ black, club greyish. Thorax slightly convex, shining, thickly punctured with fine punctures and small granules. The posterior margin is curved inwards towards the disc, emarginate, and finely but closely crenulate; lateral margins produced to the centre, with a number of long porrect reddish-brown hairs on posterior portion. Scutellum obsolete. Elytra slightly duller, with six striæ on each elytron; interstices rugose and covered with some large irregular shallow punctures, which get more shallow and smaller towards apex. Suture very distinct, smooth, shining, and impunctate. Abdomen smooth, shining; prosternal keel shining and finely punctured on sides, smooth on disc. Pygidium dull, slightly granulate. Anterior tibiæ quadridentate on exterior margin, with the apex thickened laterally at tip, and terminating in a sharp fine spine; the apex is curved inwards into a large obtuse tooth. Inner margin with a number of long reddish-brown hairs, and a small tuft of hairs on the centre of the under side of the femur, and another small tuft at the apex, on the upper side. Intermediate and hind tibiæ covered with thick reddish-brown hairs; femur and sides of abdomen pubescent. Tarsi verticillated. L. c. 25 mm.

Hab. Port Nolluth, S. Africa. (Type in coll. A. Fry.)

I have to thank Mr. A. Fry for the loan of the above interesting and unique Ateuchid. The peculiar form of the thorax will serve to distinguish it from its other allies. The form of the anterior legs is very similar to *Sebasteos*, Westw., and the cordate form of the abdomen places it after *Actinophorus*, Creutz., and *Sebasteos*, Westw. It seems a link, too, between the Ateuchites (proper) and the Old World genera of *Eucranides*—*Mnematum*, McLeay, and *Pachysoma*, McLeay.

Oxford, 1895.

COLLECTING IN NEW ENGLAND.

By W. F. FISKE.

IN Southern New Hampshire the first insects begin to awake from their long winter nap on the warm days of the latter part of March. At that time the best locality for the entomologist is the Maple-sugar camp. Here on warm days, when the sap runs well, *Grapta j-album* and *Vanessa antiopa* may be seen flitting around the tops of the trees, and sipping the sweet sap from the wounds made by the squirrels. After dusk several species of moths may be taken, and in the morning a visit to the buckets will disclose many which have fallen into the sap collected there, the rarest of which are worth the trouble of rescuing and drying.

In April the first of the moths begin to emerge from hibernating pupæ; a few Bombyces, Geometridæ, and Micros, but mostly Noctuids. *Brephos infans*, a small but bright-coloured under wing, appears about waste land by April 10th. Although several species of hibernating butterflies have been more or less common during the first part of the month, the first species to begin to emerge from the pupa are a few *Lycæna* and *Tuecla* about the 20th. The dense clumps of cassandra or meadow-fern in the swamps are in blossom at this time, and are literally alive with insect life. *Pieris rapæ*, which was introduced from Europe about thirty years ago, and the native species *P. napi* var. *oleracea*, formerly common but now very rare, appear soon after. *Colias philodice* may be noticed the last of the month. It is the only *Colias* native here, but the lack in variety is more than made up by quantity, it being very abundant.

Business in the world of Lepidoptera is not very brisk, however, until the middle of May, when nature seems to awake to the fact that June is almost at hand. The lilacs are in blossom now, and the blossoms are frequented during the day by many dusty friends. The three swallow-tails—*Papilio turnus*, resembling *P. podalirius*; *P. asterias*, the "carrot-worm," black, with yellow and blue spots; and *P. troilus*, black, with greenish white and orange spots—are very conspicuous. Several species of humming-bird moths are common during the day, and the humming-bird itself arrives, looking like a magnified specimen of *Sphinx*, and which may even be taken in a net. Two small species of *Argynnis*—the first, *myrina*, with silver spots on the under side; and the other, *bellona*, without—are very common on low lands the last of the month. Another small butterfly, *Phyciodes* (*Melitæa*) *tharos*, appears, and will continue with us all the summer. The skippers, which are in this section conspicuous for their numbers and variety, begin to appear the latter part of the month. One species, *Pamphila metea*, is quite common about the 20th around very dry sandy places, and is the only one which

may be taken in May and not in June. The night-flyers during May are numerous, mostly Noctuids, but a good many of other groups. Several species of Arctians, some of them quite handsome and most of them rare, are out now; and the large Saturnians begin to appear. The beautiful *Actias luna*, "queen of the night," is the first to emerge. When properly spread for the cabinet it has a most graceful appearance; but its flight is very awkward, having about as much grace as that of a cockchafer. If the season is good a great many moths are attracted by sugar, among which *Catocala*, or *Catocalirrhys nubilis*, is the largest. It is grey, secondaries bright yellow, with two black median bands.

June is the month of butterflies and flowers. The swallow-tails are in their glory. *Danaïs archippus* has arrived, dusty and travel-stained, from the south. Three large *Argynnis*—*cybele*, *aphrodite*, and *atlantis*—are common the last of the month. *Melitæa phaëton*, *M. harrisii*, and *M. nycteis*, are common, but very local. Satyrids are not well represented in Eastern United States; only five species are native in New Hampshire, but they are all quite common. *Neonympha eurytris*, a small dark drab species, with two eye-spots on primaries and one on secondaries, is a common species on woody hills and rocky pastures in the early part of June. *Debis portlandia*, a larger and handsomer species, is not quite so common in the woods in the valleys. *Chrysophanus hypo-phlœas* is very abundant from May until October. It occurs in great variety, all grades, from the banded to the immaculate form, being common. The variations are more abundant in the spring brood. There are five species of *Thecla* flying in June,—three common, and two rather scarce. Around the banks of brooks, where alder grows rank, a delicate and rare little butterfly may be found from the 1st of June until the middle of August. It expands about an inch and a half; the upper side is tawny orange, with curious blotches and marks in black; the under side of secondaries is brown, with grey rings. This is *Feniseca tarquinius*, as far as is known the only carnivorous butterfly. The larva feeds on the plant-lice which infest the alder, currant, &c., but is hard to find, because it covers itself with down from its victims. The Hesperidæ this month are very numerous and varied. *Ancyloxypha numitor*, a small, but pretty brown and yellow species, is common around thick grass near standing water. There are eight species of *Pamphila* (*Hesperia*), two of *Amblyscirtes*, four of *Nisoniades* (*Thanos*), and three *Eudamus*. Most of them are common, and some are very abundant. The largest and handsomest is *Eudamus tityrus*. It expands from two to two and a half inches, and is dark brown, with a translucent honey-yellow band across the primaries, showing on both sides. The under side of secondaries is overlaid with purplish scales, and has a broad band of silvery white. The moths are very numerous and varied, and it is useless to try

and enumerate them. *Samia cecropia* is the largest, often measuring six inches in expanse. *Actias luna*, *Telea polyphemus*, and *Callosamia promethea*, are not far short of it. *Hyperchiria io* is smaller, but more strikingly coloured. *Eacles imperialis*, yellow, with purplish markings, and expanding five inches, may be seen in the daytime clinging to grass and low bushes, and looking so much like a sere and yellow leaf as to deceive the eyes of any but an entomologist. Hawk-moths are abundant about the flowers of *asclepias* and honeysuckle; they are in great variety, but the large and showy species are in a great minority. The best night-collecting is done with lantern and sweep-net. It pays on most seasons to sugar, but there are not so many moths attracted as during the months of May, July, and August.

In July the season for butterflies and spinning-moths has begun to decline. The most noticeable arrival is *Argynnis idalia*, a large species, expanding from three to three and a half inches, with secondaries of a beautiful purplish black, with cream spots. *Satyrus alope* is extremely abundant throughout the month; the normal form has a broad yellow band on primaries; in var. *nephele* this band is wanting, but all the intergrades occur. A visit to the White Mountains, in the northern part of the State, is of particular interest to the entomologist at this season of the year. A pale and delicate Satyrid, *Chionobas semidea*, inhabits the highest peaks, and is found in no other locality within 2000 miles. A small *Argynnis* is also native there, and nowhere else; and several other species of butterflies, which are rare or unknown on the lowlands to the south, are common. Scattered through the State are many small mud-bottomed ponds, generally surrounded by a dense growth of spruce, and bordered by a bed of sphagnum. This is gradually encroaching on the water, not displacing, but floating upon it, until it is thick and strong enough to bear a man's weight. Here many plants which grow nowhere else find a footing and flourish, and with them an insect fauna. Among others is a small butterfly, *Chrysophanus epixanthe*. The female is dingy enough; but the male, when alive, with wings expanded to the sun, is a living gem. The primaries are brown, with violet reflections; the secondaries duller, with a wavy submarginal line of copper-red. From the middle of July until the 1st of September is the best time of the year for sugaring. There are between thirty and forty species of *Catocala* more or less common, all of which it is possible to capture in good condition during this season. A row of neglected pear trees forms another very good collecting locality at this season of the year, the honey-dew having an attraction superior to any artificial mixture which I have yet experimented with. There is always the possibility, too, of taking the enormous *Erebus odora*, which has occasionally been seen in this locality, and sometimes occurs in numbers.

August has little new in the way of butterflies, but several species appear as second and third broods. Among the former may be mentioned *Papilio troilus*, *P. asterias*, *Vanessa antiopa*, *V. atalanta*, *V. huntera*, *V. cardui*, *Danaïs archippus*, and the two *Limenitis*,—*L. artemis* and *L. disippus*. *L. artemis* is, perhaps, as handsome a butterfly as is to be found in New England. It is purplish black, with a broad white band across both wings. *L. disippus* is fulvous-veined, and bordered with black as in *Danaïs*. *Colias philodice*, *Argynnis myrina*, and *A. bellona*, appear as a third brood about the 1st of September. Although there is but one brood of the large *Argynnis*—*idalia*, *cybele*, and *aphrodite*—fresh specimens, especially females, continue to emerge until the 1st of September.

Good collecting is at an end by September, except in a few groups, notably *Vanessa* and *Agrotis*. *Danaïs archippus* occurs in great numbers preparatory to migration. The flight of this butterfly is very graceful, and a clover field when they are abundant is a very pretty sight. *Hemileuca maia*, a medium-sized Saturnian, is common on meadows. The wings are black, with a white band across both, and are of the texture and appearance of *Parnassius*. It flies by day; and when struck with a net or hat it folds its wings over its back, curls up its abdomen and legs, and feigns death.

October is a comfortless month for the entomologist. There is a better variety than in March, but there is much difference in looking forward or backward to June. There is little or nothing new. A few moths emerge, and at once hunt for winter quarters. The butterflies of the genus *Vanessa* give life and colour to the beautiful Indian-summer days, but they take good care to find a secure lodging at night, for fear that the next day may prove to be borrowed from December. A few *Colias* and *Pieris* appear as a fourth brood, but they are doomed to perish miserably during the wintry blasts of November.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

BY W. F. DE VISMES KANE, M.A., M.R.I.A., F.E.S.

(Continued from p. 83.)

HADENA DENTINA, *Esp.*—Common, widely distributed, and very variable. Beside the type, with bluish-grey stigmata and subterminal band on a darker greyish ground, there is a common form of warm sepia tone, the central shade being similar but darker. The pale grey var. *leucostigma*, Haw., occurs rarely in Galway, Sligo, and elsewhere; and the unicolorous obsolete form, var. *ochrea*, Tutt (*dentina*, Haw. and Fab.), with yellow

patches at base of the inner margin and elsewhere, is occasionally met with.

HADENA TRIFOLII, *Rott.*—"Near Dublin, by the Rev. Joseph Greene" (*B.*). Mr. W. E. Hart reports having taken a specimen at Kilderry, near Derry, but I have not seen it.

HADENA DISSIMILIS, *Knoch.*—The Devil's Glen, Wicklow, not common (*B.*); Castle Bellingham (*Thornhill*), and near Dundalk, Co. Louth, pretty numerous; Castle Gregory, near Tralee, Kerry, not rare; Clonbrock, Co. Galway, a few (*R. E. D.*). My Kerry specimens, and Mr. Thornhill's from Castle Bellingham, are referable to var. *suasa*, Bork.

HADENA OLERACEA, *L.*—Very common everywhere. The usual form is that with bright rusty brown ground colour, and well-marked stigmata and subterminal line. But specimens with dark brown ground, marked only with an orange trace of the reniform stigma, and an almost obsolete subterminal line, occur on islands off the Kerry coast, and occasionally elsewhere.

HADENA PISI, *L.*—Widely distributed, but rarely numerous. The Linnean type appears to be of a ferruginous ash colour ("ferrugineo-cinereis"), clouded with grey. I have a Scandinavian example of it which closely approaches Mr. Tutt's description of his var. *pallida*. I have not met with the type in Ireland. The very unicolorous yellowish-red type (var. *rufa*, Tutt) is very rare here, and I have never met with it of so yellow a tone as in English examples I possess; but the mottled form of it, varying in distinctness of pattern but decidedly redder than English examples, is more frequent (var. *distincta-rufa*, Tutt). The somewhat unicolorous purplish form, var. *scotica*, Tutt, I have not seen; but the majority of Irish specimens belong to the mottled purplish form with pale or ashy-grey stigmata and markings, and is frequently extremely bright and handsome. Var. *splendens*, St., I have from Toberdaly, King's Co., and Favour Royal, Co. Tyrone, of a ruddy brown, indistinctly marked with strigæ and stigmata, and the subterminal line nearly obsolete, except at the anal angle. I have a specimen of this also from Scandinavia. I cannot agree with Mr. Tutt in placing it near the type, which he gives in his classification, by some oversight probably, as having "a red-brown ground." Beside the foregoing there are in Ireland (found rarely) brown forms, from a bistre tone to an ashy grey-brown, with the subterminal line sometimes quite obsolete, except a trace at the anal angle, and, on the other hand, sometimes of twice the normal width throughout. These forms I have taken at Killary Bay and Clonbrock, Co. Galway; Drumreask, Co. Monaghan; and the neighbouring Co. Tyrone; Markree Castle, Sligo; and Killynon, Co. Westmeath; and the var. *distincta-scotica* from the same; while the ruddy forms are

from widely distant localities, and not localised. A dark brown specimen from the Bog of Allen, near Banagher, has exactly the coloration of *H. adusta*, and approaches Mr. Tutt's description of his var. *suffusa*, but the markings are not suffused but blotched with black, especially on the inner margins of the broken subterminal line and between the stigmata.

HADENA THALASSINA, Rott. — Common. Two Scandinavian examples from the collection of Sven Lampa show a warm greyish brown ground colour, with the pale strigæ and stigmata very slightly represented, but on one the dark \neg trait and stigmatal outlines darkly marked. Their special characteristic is, however, the almost total absence of the whitish basal patch, though the black forked streak below it is retained. This pale patch, distinguishing this species usually from every form of *H. adusta*, is here obsolete, except for perhaps a faint pallor of the ground colour. With this exception identical greyish forms (var. *humeralis*, Haw.) occur in Ireland, but rarely. One from Hollybrook, near Boyle, is almost of a unicolorous grey, marked only by the white and black basal traits, and some traces of the subterminal pale line. Var. *achates*, Hb., occurs rarely, as at Sligo, and Favour Royal, Tyrone. The normal forms of Irish *H. thalassina* are very bright and strikingly marked, being in a series far handsomer than such as I have seen from England. That this is so, the frequently distinct delineation of the dentate mark (which Mr. Tutt, in describing *H. contigua*, notices as absent in *H. thalassina*) is evidence. Their ground colour varies from a rich brown madder to the cold bistre brown of *H. adusta*. The stigmata are often ringed with white, and sometimes filled in with grey, and the black and white strigæ and blotches vivid and distinct. The most striking form I have ever seen has the ground of brownish grey, with large white stigmata (except the lower part of the reniform), dentate mark, costal dashes, and strigæ. Throwing these into relief are sharply pencilled black markings and the \neg trait, producing a very chequered appearance. Another form, of a warm brown ground, has the stigmata and dentate mark of paler tone, fused together, and with suffused outlines. The elbowed and basal lines are twice as broad as in most specimens, and shaded off at the edges.

HADENA CONTIGUA, Vill. — Local, and sometimes abundant. Very bright and handsome forms are found on the mountains bordering L. Gill, Sligo, and (but rarely) among those among which the R. Roughty takes its rise above Kenmare, probably approaching the form which Mr. Barrett noticed at Cannock Chase. They are suffused with a bright pink on the areas of the stigmatal and dentate and costal base marks, and when fresh are the most beautiful of all the genus *Hadena*. In one light Sligo example the whole ground colour (except a white patch of

subterminal band at the anal angle) is suffused with rose colour. Some rose-flushed specimens have the basal half of the fore wing very dark, the basal striga and all markings, except the costal basal patch, being obsolete. The var. *dives*, Haw., occurs with the submarginal band very grey at Sligo, Kerry, and Castle Taylor, Co. Galway. None of these forms appear to be topomorphic. Localities:—Powerscourt, Co. Wicklow (*B.*); Cap-pagh, Co. Waterford, scarce; the districts about Kenmare and the upper L. of Killarney, not very rare; Ballinahinch, Moy-cullen, Ardahan, Clonbrock, scarce; and one near Galway in September (a second emergence apparently) by Mr. Dillon in 1894; Cromlyn, Westmeath, one (*Mrs. B.*); Newcastle, Co. Down, one, which Mr. Watts describes as “having the darker parts of the fore wings suffused with rose-pink, and the pale portions a semi-metallic green.” These colours, however, subsequently faded.

(To be continued.)

NOTES AND OBSERVATIONS.

PERIPLANETA AUSTRALASIE AND *P. AMERICANA*.—The two cockroaches figured *ante*, p. 97, which both appear to have taken up their abode with us, are extremely likely to be confused one with the other. Both are rich reddish brown in general colouring, but it will be seen that while *P. americana* is the larger, *P. australasiae* is more distinct in its markings. The deep black patch on the thorax of the latter, together with the broad yellow streak along the basal portion of the costal margin of the fore wings, would be sufficient to distinguish the species; but it should also be noticed that the hind wings are comparatively broader, and the mouth appendages shorter than those of *P. americana*. The abdominal appendages are very different in the two species. The specimen of *P. australasiae* figured was captured in Kew Gardens on April 23rd, 1895, and recorded in error as *P. americana* (Entom. xxviii. 257); of the two, it is much the scarcer insect in these islands.—W. J. LUCAS.

NOMENCLATURE OF THE “BEE HAWK-MOTHS.”—I hope you will insert this note, to correct an error in the February number of the ‘Entomologist’ (*ante*, p. 41), as, if the error remains, there will always be a doubt thrown upon the record in question when it appears in print in the Harrow School publication. The insect captured by Mr. Percy Rhoades-Smith last year, and recorded (Entom. xxviii. 233), was a specimen of the broad-bordered species, and not the narrow-bordered species. I had the pleasure of examining the specimen shortly after its capture.—N. C. ROTHSCHILD; 25, Jesus Lane, Cambridge, Feb. 25th, 1896.

CAPTIVE FEMALE *CHEROCAMPA ELPENOR* ATTRACTING MALE.—In June, 1893, a friend of mine captured, near Exeter, a female *Cherocampa elpenor* and, not being an entomologist, he put it alive in a match-box. The next day he came on to Burton with his capture. While waiting

at a station near Cheltenham he was surprised to see a moth, similar to the one he had in his pocket, keep flying round him and finally settle on his coat. He concluded it was his moth which had escaped, and he remarked to his companion how sorry he was to lose it, as it might have been a "rare specimen." On looking at his box, to see how his capture could have got out, he was, to use his own words, "astonished to find the insect was still in the box, and that this was another but similar individual which had settled on me." It is a well-known fact that the male of such insects as *Bombyx quercus*, *Endromis versicolor*, &c., are readily attracted by a captive female, but is this not rather uncommon among the "hawk-moths"? Can any of your readers tell me of similar incidents?—W. R. SMITH.

SETTING LEPIDOPTERA.—Mr. Woodforde's remarks (*ante*, p. 83) are excellent, and go to the root of the matter. It is much to be wished that they may act as a nail in the coffin of the ungainly atrocities one sometimes acquires under the name of "specimens," especially among the Geometers. I do not see why there should not be some generally recognised standard of setting among those who exchange specimens; it must be confessed that there is no such thing now, although either the figures in Newman, as Mr. Woodforde says, or perhaps still better, the figure in Greene's 'Insect Hunter's Companion,' would supply the want. Press of work in summer should not be pleaded as an excuse, for it is surely more satisfactory to take fewer insects and set them properly, than to have a large number of specimens which correspondents will scarcely care to receive. Greene's remarks on this subject in the work mentioned above ought to be carefully read and laid to heart by every entomologist. A great reform would be quickly effected, if every exchanger would make a resolve never to send out an insect that he would not care to receive himself. I think it will be admitted that there has been considerable improvement in this respect of late years, but it is well to refer to the matter occasionally, that younger generations may know what is expected of them. As regards methods of setting, no doubt everyone will work out his own plan and stick to that; and, provided two or three general principles, well stated by Mr. Woodforde, as to height on pin and height on setting-board, are observed, the result will always be satisfactory. Details may differ indefinitely. Some people set their insects with cotton, a method which, personally, I regard with amazement not unmixed with awe. Others use bristles, the working of which I do not quite catch from Mr. Woodforde's instructions. For myself I find a thin strip of paper, supplemented afterwards by a broader one, does the business very well. But it is certainly necessary to have your specimen well relaxed, and the plan I have always adopted is simply to leave the day's catch in the cyanide bottle till the next morning, when my experience is that they are in just the right condition for pinning and setting, and they can be kept so for any length of time by transferring them to a box lined with damp cork. Of course, if kept here too long they will develop mould, and it is best to set them without the intervention of the damp cork, if possible, especially as I think it helps them to become greasy. As to grease, I do not think it need be much of a bugbear. Some moths certainly should be cleaned out at once,

but most may safely be left untouched, for if they should develop grease they can then be as easily cleaned as at first; and if they do not, all the trouble will have been saved. Those which ought to be done at once are *Cerura*, *Cossus*, the larger *Sesias*, and *Luperina*. Ten days seems a good average time to leave on the setting-board, and I have found that even a moth which has been relaxed and reset will not spring when left at least so long. The large hawk-moths should be left at least fifteen days; and it should be remembered that insects do not dry so quickly in damp weather.—(Rev.) W. CLAXTON; Sunnyside, Woolston, Southampton, Feb. 29th, 1896.

[Mr. Woodforde was good enough to furnish drawings to illustrate several points of his article, but, unfortunately, it was not convenient to reproduce them. Anyone wishing to know how to make a setting bristle will find the information, together with a drawing of this implement, and also of other useful items connected with setting, in 'The Lepidopterist's Guide,' by Dr. Knaggs.—Ed.]

SCARCITY OF *PIERIS BRASSICÆ*.—Of the many problems which attract the attention of the entomologist, perhaps the abnormal abundance or scarcity of a given species in any particular locality is not the least interesting. Many instances of the former or latter in all probability occur in the experience of most collectors. The most remarkable instance of the latter which has come under my own observation is undoubtedly furnished by *Pieris brassicæ*; this is the more interesting, as it is one of the most generally distributed and abundant species found in these islands. Previous to 1893 *P. brassicæ* was one of the most abundant species found in this locality, and the damage done by its larvæ to the various cultivated varieties of *Brassica*, &c., was in many seasons very great; but in that year I first noticed a great falling off in its usual numbers, in fact, I cannot remember seeing more than a score of specimens altogether. In 1894 not a single specimen was observed, although closely looked for. In 1895 I paid particular attention to every specimen of the Pieridæ seen, but without detecting *brassicæ* in a single instance. Neither larvæ nor pupæ were seen in either year. Thus it is now more than two years since I saw a living specimen in any stage in this district. Of course I am not prepared to say that the species has ceased to exist in this particular locality, for its apparent absence may be in part due to imperfect observation, as it is impossible for one observer to cover even a limited district with absolute certainty; but its absence, either apparent or otherwise, is sufficiently remarkable, for, as every one knows, *brassicæ* is a species which does not as a rule require searching for; it forces itself upon the notice of even the least observant, either in the imago stage, or, as an unwelcome visitor, in the larval stage, in the kitchen garden. In the 'Entomologist' for 1894 (vol. xxvii.) there are several short notes calling attention to its scarcity in widely divergent localities; but in the volume for 1895 (nor in any other magazine to which I have access) I cannot find any notes recording unusual scarcity of the species under consideration. So perhaps we may assume that it was found in its usual numbers in most other districts. As far as this locality is concerned, it will be interesting to see if it occurs during the present year (1896), or if the unusual

scarcity is continued for the third year in succession.—W. GROVER; Guildford, February, 1896.

LARVA OF *PIERIS BRASSICÆ* IN DECEMBER.—I was greatly surprised last Sunday to see larvæ of *Pieris brassicæ* feeding upon a cabbage-plant in a neighbour's garden. Is not this an unusual occurrence at this time of the year? The larvæ I obtained in August were full-fed in September, and pupated the same month.—GEORGE R. GARLAND; 94, Sedgwick Road, Leyton, E., Dec. 19th, 1895.

WINGLESS OR PARTIALLY WINGLESS FEMALES.—Mr. Arkle remarks (Entom. xxviii. 163) upon the sluggishness of wingless females. In this I certainly cannot agree with him. I grant that they are quiet enough by day, but has he seen them at night? The activity of those of *Nyssia hispidaria* is quite remarkable, and I venture to say that they are quite capable of distributing their ova, even to the outer extremities of the larger oak branches. It appears to me that the loss of wing power is in a great measure compensated for by the length and strength of the legs. I have found most females inactive until after copulation, but the wingless females which have come under my observation are an exception to this rule. I should think that if it was a common practice for the males to carry up the females, pairs *in cop.* would be frequently captured on the wing.—A. T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W.

NOTE ON *VANESSA URTICÆ*.—I found the larvæ of *Vanessa urticæ* exceedingly abundant last season, both in this district and in Devonshire. A series bred from Chiswick larvæ were remarkable for their tendency to the banded form in nearly all the specimens, and several were very strongly marked in this respect. Subsequently, hoping to get further varieties, I visited the exact locality, and collected a number of pupæ, of which all but one were suspended to the stems or leaves of the very nettles on which the larvæ had been nourished. The pupæ were all of the gilded form, that is, entirely gilded or nearly so, and they were consequently very beautiful objects, especially in a strong light. Although this form is mentioned in Newman's work, I had not previously observed it. I was quite unsuccessful in getting any good examples from these pupæ, for each produced only a multitude of small parasites. Could it be that the larvæ, being stung, had not sufficient strength to travel and pupate in the ordinary way on fences, &c., where I usually find them, and that the gilded appearance of the pupæ was caused by their position—unsheltered from the sun upon the wholly or partially defoliated food-plant?—ALFRED T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W.

APLASTA ONONARIA.—The inclusion in the catalogue of Mr. C. E. Fry's insects, at his sale on the 9th inst., of a specimen of this insect, described as "taken at Folkestone, 3rd August, 1877, by C. Bailey," induces me to add a few remarks to Dr. Knaggs's note on this species (Entom. xxvii. 135), Mr. Bailey's specimen being, I believe, hitherto unrecorded, and coming as a surprise to most of us. The known captures were seven in number, all being taken in the Warren at Folkestone. The first specimen was taken on or about July 18th, 1866, by Mr. B. Piffard. This specimen was, as Dr. Knaggs says,

given by Mr. Piffard to Mr. Henry Doubleday, in whose collection it still remains at Bethnal Green Museum. Three specimens were taken by Mr. Frank Standish, from whose collection they were purchased by Mr. S. Webb, of Dover, in whose rich collection they now are. Two other specimens were taken by Mr. Holyday, who tells me that they are both still in his own collection. The last of the seven specimens was taken by Mr. W. Purdey, of Folkestone, in June, 1871 (Ent. Mo. Mag. viii. 92). This specimen was sold by Mr. Purdey to Mr. Burney, at whose sale I purchased it. The fact that none of Mr. Burney's four specimens, although catalogued as taken by Mr. Piffard, were really taken by that gentleman was known to every one in the auction-room, as a letter from him to that effect was publicly produced and read out; but it was not generally remembered that one of these specimens really was Mr. Purdey's specimen. Those, however, who did remember it, and knew how specially interesting the specimen was to me, most kindly refrained from bidding against me, and enabled me to secure it. To prevent any future question or mistake, I also bought Mr. Burney's three other specimens, which are, of course, utterly valueless. I was with Mr. Purdey at the time of its capture. I saw him strike at it, saw it in his net, and by the light of his lantern assisted in determining its identity. It was to me therefore almost as if I had taken it myself. It was taken in the small rectangular recess on the left hand of the up-line between the crossing where the Warren Station now stands and the tunnel nearest Folkestone. I might perhaps add that shortly before Mr. Burney's death, Mr. Purdey wrote to him asking whether the specimen was still in his collection, and received a reply from Mr. Burney stating that it was; and since the sale I have taken it to Mr. Purdey, who identified it as his own.—C. A. BRIGGS; 55, Lincoln's Inn Fields, March 12th, 1896.

SESIA ANDRENIFORMIS.—Mr. Griffiths and Mr. Harding, of Clifton, both write to say that the late Mr. Wilkinson, of Scarborough, took only one specimen of *S. andreniformis* at Durdham. This particular specimen was certainly in Mr. Fry's collection, recently sold at Stevens's but the origin of the other examples, two in number, is now left in doubt.—RICHARD SOUTH.

The three specimens of *Sesia andreniformis* were thought by Mr. Fry and self to have come out of the late Mr. Wilkinsoa's collection. They were bought from Mr. E. G. Meek, who will doubtless be able to say from what source he obtained them.—H. McARTHUR; 35, Averill Street, Fulham Palace Road, W.

A FURTHER NOTE UPON THE LARVA OF *COLIAS HYALE*.—Although a considerable time has elapsed since my notes upon the life-history of *Colias hyale*, when breeding this species from the egg (Entom. xxvi. 7), I think it well, if only on account of the few opportunities we have of making any observations upon this insect, to record the fate of the larvæ that were then alive. At that time (Dec. 10th, 1892) three larvæ were living in a perfectly quiescent state, having been in that condition for about thirty days. On Nov. 26th these three larvæ, having been in one position for about a fortnight, two resting on the side of the jar in which they were contained, and one on a partly curled-up leaf, all being apparently unaffected by the high temperature

to which they had been subjected, I removed them from the heat to see whether it would be possible to hibernate them, and for this purpose placed them in a room not artificially heated. On Dec. 16th one larva changed its position slightly, but, after again remaining stationary for a few days, died, and on Feb. 22nd, 1893, the second one died. The third and last remained on the clover-leaf until March 17th, when, finding it moving about, I placed it upon a plant of clover. On the following day it commenced feeding, resting at night usually on the stem of the plant; it fed freely, and all went well until April 8th, when it affixed itself to the stem and assumed the well-known position portending a change of skin; but unfortunately it did not survive the operation, as on April 10th it was lying on the surface of the moss in a helpless condition, and died on the 13th, having failed to moult. Its length was then seven-sixteenths of an inch. It will thus be seen that this larva refrained from food from the middle of November to March 17th, say, over 120 days; and thus it appears clear that *Colias hyale* has the power of hibernating in the larval stage, whatever it may do in its natural state in those countries more favoured by this species than our own; and it would be interesting if some of our authorities can definitely tell us in what stage *C. hyale* passes the winter season upon the Continent, and in those parts of the globe in which it is a regular inhabitant.—HERBERT WILLIAMS; 80, Hanley Road, Hornsey Rise, London, March 9th, 1896.

VANESSA URTICÆ IN JANUARY.—At midday on January 16th last, a specimen, in good condition, of *V. urticæ*, deceived by the mild weather, was tempted to take a winter flight in the garden.—A. J. HOARE; 13, Knight's Park, Kingston-on-Thames, Feb. 5th, 1896.

[Several correspondents have written to inform us that they observed the species on the wing during the first half of February.—ED.]

RETARDED EMERGENCES.—I bred during last season *Papilio machaon* and *Anthocharis cardamines*, both of which had been two winters in pupa. Forcing was attempted early in the previous year, but over one dozen of the former and three of the latter held over. The *A. cardamines* are quite normal, but two of the *P. machaon* pupæ were quite unusual in the development of the imago. The abdomen of the perfect insect appeared quite ready for emergence before the pattern of the wings became visible. One example died, and the other, though much crippled, resulted in a remarkable dark variety. I may also mention two emergences of *Eriogaster lanestris* (four winters in pupa).—A. T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W.

PARASITES BRED.—*Macquartia affinis*, Schin. This fly has been bred from the larva of *Chrysomela varians* by Mr. Key, of Plymouth, who kindly gave me a specimen.—*Eucyrtus flaminus*, Dalm. I have bred this pretty little Chalcid from the apple-scale insect, *Mytsillaspis pomorum*.—*Myina phillyreæ*, Hal.; parasitic on *Aleyrodes phillyreæ*, Hal. Both of these occur commonly in Mr. Richardson's garden at Chickerell.—*Exochus gravipes*, Gran.; from *Nephropteryx genistella*.—*Tetrastrichus eudemus*, Walk.; from *Coleophora trifolii*.—*Entedon amyelas*, Walk.; from *Nepticula gei*.—*Derostenus gemmeus*, West.; from *Conchylis*

francillana.—*Tranoderis macilipenne*, Walk.; from *Nepticula oxyacanthella*.—C. W. DALE.

RECENT ADDITIONS TO THE BRITISH LIST OF LEPIDOPTERA.—Mr. B. A. Bower has prepared, and had printed, a label-list of all the recent additions to our lepidopterous fauna. The compiler has asked us to state that he will be happy to send a copy of this list to any one who may want it, on receipt of an addressed and stamped ($\frac{1}{2}$ d.) envelope. His address is—Langley, Eltham Road, Lee.

CAPTURES AND FIELD REPORTS.

NOTE ON *HYBERNIA RUPICAPRARIA*.—Acting on a hint given me by my friend and neighbour Mr. Woodforde, I have been taking pretty freely during the past week the females of *H. rupicaprarica*. I have found both sexes by lantern-light, sitting on hawthorn hedges, though of course the females are far more difficult to see than the males. I find the former increasingly abundant as the night gets older, and generally on the highest twigs of the hedges, where they await, I suppose, the advances of their suitors. But it strikes me as remarkable that, although I have several times seen the two sexes within a foot or two of each other, I have not, so far, seen any *in cop*. It may be that they pair late at night, *viz.* after ten o'clock, up to which time I have been out on several occasions. Can any of your correspondents give me information on this point?—(Rev.) CHAS. F. THORNEWILL; Calverhall Vicarage, Whitechurch, Salop, Feb. 14th, 1896.

EUGONIA ALNIARIA (*TILIARIA*), *HYBERNIA DEFOLIARIA*, &c. — Mr. Garland's communications (*ante*, p. 66) as to the scarcity of *Eugonia alniaria* (*tiliaria*) in the Leytonstone district, is somewhat interesting to me. I have done very little collecting for the past ten years, but intend to make up in the future for my neglect in the past. In 1884 and 1885, when living near George Lane Station (under two miles from Leytonstone as the crow flies), I used to take this insect freely at indoor light, and always regarded it as common. I also noted, as stated by Mr. Garland, the exceeding abundance of *Hybernia defoliaria* in Epping Forest last November and December, though this was to be expected from the boundless profusion of the larvæ in the preceding May and June. I then observed many hawthorn bushes stripped of every vestige of a leaf, the bare twigs being literally alive with larvæ, chiefly those of *H. defoliaria*. Somewhat to my surprise, I found a newly emerged male of *H. defoliaria* at Monk Wood so late as Jan. 2nd of this year. Perhaps I may be allowed to add that I shall be glad to make the acquaintance of entomologists residing in this neighbourhood, or anywhere around Epping Forest, with a view to joint excursions during the coming season, &c., and shall esteem it a favour if any such will call or write.—E. B. BISHOP; 7, Anton Street, Amhurst Road, Hackney, March 4th, 1896.

VARIETY OF *LYCÆNA BELLARGUS* (*ADONIS*).—Mr. R. M. Prideaux (*ante*, p. 91) mentions the capture of a white underside variety of *Lycæna alexis* in the Isle of Wight. It may therefore be interesting to record the capture, in September last, of what appears to be an exactly parallel form of *L. adonis* on the South Downs near Eastbourne. The specimen, like

that of *L. alexis* captured by Mr. Prideaux, is a male.—E. M. MONTGOMERY; 32, The Grove, Ealing, March 13th, 1896.

CALLIMORPHA HERA IN SOUTH DEVON.—After Mr. W. Hewett's exhaustive remarks upon the capture of the imago and the breeding of this lovely species (Entom. xxviii. 290), I have very little to add. In company with Mr. H. Robson, I had the pleasure of meeting Mr. Hewett near Starcross, and it is pleasant to be able to endorse his statement regarding the wide distribution of *C. hera*. Contrary to his experience, we found it more easily obtained in bright sunshine. During the first three days of our visit the weather was dull, with a great deal of rain, and jointly we only obtained three specimens (one on each day), while on the other hand eleven examples were secured on one very hot day. Referring to the specimen taken on the wing, not apparently disturbed, it was flying over clover blossoms quite naturally, in fact, like a butterfly. Although none were attracted by the fen-lamp, probably because we did not stay late enough, one example (a female) was discovered on the outside of the bedroom window, at rest on the framework, about midnight. This was on the last night of our visit. The window had an eastern aspect, facing the estuary of the Exe. Referring to other species captured, the following I think are not mentioned by Mr. Hewett:—*Pyrameis cardui*, *Colias edusa* (one seen), *Thecla quercus*, *Noctua umbrosa*, *N. rubi*, *Triphana ianthina*, *Hadena suasa*, *Charæas graminis*, *Selenia bilunaria*, *Crocallis elingvaria*, *Eugonia fuscantaria*, *Lobophora viretata*, *Melanippe unangulata*, *Anticlea rubidata*, and *Cidaria russata*. *Abraxas grossulariata* we found exceedingly abundant in the hedgerows, and on several occasions it gave us a false alarm. Larvæ appeared decidedly scarce, but they were not much worked. *Eupithecia linariata* infested nearly every patch of toadflax, and a solitary full-fed *Smerinthus tilia* was found under an elm.—ALFRED T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W.

MOTH-TRAPS DURING 1895.—On the whole the season was quite up to the average, though I was unable to set the traps during part of July and September and the whole of August. Several species, therefore, which I have taken in other seasons are necessarily absent. The following were taken which are new to my "trap-list," viz.:—*Sarothripus undulanus* (one), *Gortyna ochracea* (one), *Noctua triangulum* (several), *Agriopsis aprilina*, *Calocampa vetusta* (one), *Asthena luteata* (one), *Cabera exanthemaria* (several), *Macaria notata* (one), *Lomaspilis marginata*, *Eupithecia castigata*, *E. indigata* (one), *E. dodoneata* (two), *E. coronata* (one female), *Lobophora viretata* (one), *Thera firmata*, *Melanippe unangulata* (one), *Melanthia bicolorata* (one), *Cidaria corylata* (several), *Peronea variegana* (one), *Penthina ochroleucana* (one), *Sericoris lacumana*, *Bactra lanceolana*, *Nemophora schwarziella*, *Ecophora flavifrontella*, *Æ. pseudospretella*, *Coleophora fabriella*, *C. albicosta*. The following were the best captures among the species previously recorded, viz.:—*Stauropus fagi*, *Pterostoma palpina*, *Notodonta trepida*, *Rusina tenebrosa* (three females, only males previously recorded), *Xanthia aurago*, *Asteroscopus sphinx* (208 males and one gynaecious specimen—right antenna male and left female), *Aventia flexula*, *Eurymene dolobraria*, *Eupithecia pulchellata*, *Leptogramma literana*.—E. F. STUDD; Oxtou, Exeter, Feb. 25th, 1896.

LEPIDOPTERA AT BLOXWORTH IN 1895.—Various causes during 1895 hindered the usual amount of attention we were able, in former years, to

give to Lepidoptera; but, so far as could be observed, it was an unsatisfactory season in this district. Macros were decidedly scarce, and few worth noting, excepting in respect to their scarcity; some species, usually common, did not appear at all. Micros, however, turned up rather better, but in numerous instances these also were much rarer than usual. Among the best that came to hand, both of Macros and Micros, perhaps the following are worth recording:—*Sphinx convolvuli*.—*Lasiocampa trifolii*.—*Lithosia complana*. This moth I have not seen, until now, for many years past; formerly it used to be of pretty regular occurrence.—*Platypteryx hamula*.—*Triphæna subsequa*. Two, just emerged, under the leaves of a thistle in the middle of a grass-field.—*Plusia festuæ*. A larva on meadow-sweet, in June, spun up in a loose cocoon, and the perfect insect came out about two or three weeks after. I have only met with this species once before in Dorset.—*Acidalia immutata*.—*Lobophora viretata*.—*Scotosia undulata*.—*Cataclysta stratiotalis*.—*Phoxopteryx diminutata*. Scarce.—*P. subarcuana*. Abundant.—*P. biarcuana*. Rather frequent.—*Ditula semifasciana*.—*Cnephasia cinctana*.—*Eupæcilia geyeriana*. Scarce; chiefly though, I think, owing to the very unfavourable weather for its flight. On several evenings, though worked for closely, not one appeared; but on the next evening it was flying abundantly for half an hour or so, but almost all worn.—*Tinea nigripunctella*. This (I believe rather rare) little moth has occurred here at the rate of about one in two or three years for many seasons past; this last year, however, I caught 102 on one window—next to the room in which I sit—during about four weeks, in July and August.—*Sophronia parenthesella*. Not seen here until now, for many years.—*Cerostoma vittella*. Several; usually very scarce.—*Ypsolophus lucella*. Very scarce this season.—*Chauliodus charophyllellus*.—*Laverna lacteella*. Very scarce.—*L. decorella*.—*L. atra*. More abundant than usual; on apple and whitethorn.—*Æcophora lambdella*. Scarce.—*Batrachedra præaugustella*. Rather abundant on one spot. I had not met with it until now for many past years.—*Cosmopteryx orichalcella*. Much scarcer than in the previous season, but not unfrequent in one swampy locality.—*Gracilaria tringipennella*. Two specimens; the first I have met with in this district.—*Stephensia brunnichella*. Very scarce.—*Aciptilia paludum*. Very scarce; one specimen as early as June 4th.—O. P. CAMBRIDGE; Bloxworth Rectory, Feb. 16th, 1896.

MACRO-HETEROCERA IN THE GUILDFORD DISTRICT (continued from p. 93).—NOCTUÆ.—**Bryophila perla*. Fairly common at rest on garden walls. These latter are here in many cases built of "Bargate stone," which quickly becomes covered with lichen.—**Acronycta psi*. Common; both imagos and larvæ. It is quite possible that a few *A. tridens* are mixed with these; but as I have never found larvæ of this species, and find I am unable to distinguish the imagos apart, it is impossible to say with certainty if it occurs here.—**A. leporina*. Two specimens; July 26th, 1888, and June 25th, 1895.—**A. aceris*. A few; both imagos and larvæ. A number of the latter found in the garden in 1895.—**A. mega-cephala*. A few; both imagos and larvæ.—*Diloba cæruleocephala*. Common; chiefly as larvæ. On May 30th, 1889, I found a number of larvæ feeding upon common laurel; of four taken only one attained the imago stage; the others died when nearly full-fed. Perhaps the food-plant had something to do with the mortality. I know this food-plant has been recorded before (Entom. xxiii. 292, &c.), but I believe it is not usual.—**Leucania conigera*. Fairly common at flowers of privet (*Ligustrum*

vulgare) in most years.—**L. lithargyria*. A few imago, but larvæ very common.—**L. impura*. Rather common; also larvæ, **L. pallens*. Common. There was a late brood of this species at end of Aug. and beginning of Sept., 1893.—**Hydræcia nictitans*. One specimen, Sept. 15th, 1891.—**H. micacea*. One at light, Aug. 31st, 1893.—**Axylia putris*. Fairly common.—**Xylophasia rurea*. Fairly common.—**X. lithoxylea*. A few specimens.—**X. monoglypha*. Very common in most years, but scarce in 1895.—**X. hepatica*. A few, but several years ago.—**Neuronia popularis*. Two, Aug., 1886.—**Cerigo matura*. One taken in 1885.—**Luperina testacea*. A few specimens.—**Mamestra sordida*. A few only.—**M. brassicæ*. Abundant every year.—**M. persicariæ*. Rather common. Larvæ on many different plants.—**Apamea basilinea*. Common everywhere.—**A. gemina*. One specimen in 1886.—**A. didyma*. Very common, and exceedingly variable.—**Miana strigilis*. Fairly common, and rather variable.—**M. bicoloria*. A few specimens.—**Grammesia trigrammica*. A single specimen.—**Caradrina morpheus*. Fairly common.—**C. quadri-punctata*. One specimen in 1886.—**Rusina tenebrosa*. Two or three odd specimens.—**Agrotis puta*. One pupa: imago emerged June 6th, 1894.—**A. segetum*. Common in most years.—**A. exclamationis*. Very common in most years, but scarce in 1895.—**A. corticea*. Common in most years.—**A. tritici*. Fairly common.—**A. obeliscæ*. One specimen, July 20th, 1895, taken at flowers of *Epilobium angustifolium*.—**Noctua plecta*. One, June 4th, 1893.—**N. c-nigrum*. A few, but several years ago.—**N. triangulum*, *N. brunnea*, **N. festiva*. A few each year.—**N. xanthographa*. Very common.—**Triphæna ianthina*. Rather common in 1886, but only a few seen since.—**T. comes*, Hb. Very common, both imago and larvæ.—**T. pronuba*. Abundant. Variation considerable.—Var. *innuba*. Common. Larvæ only too common.—**Amphipyra pyramidea*. Fairly common at treacle in most years, but not seen in 1895.—**A. trago-pogonis*. Very common in most years. A few larvæ found on various plants. One found feeding upon stonecrop (*Sedum acre*).—**Mania typica*. A few specimens.—**M. maura*. Rather common in most years, but scarce in 1895.—**Pachnobia rubricosa*. A single specimen taken March 21st, 1894.—**Tæniocampa gothica*. Common in most years. Larvæ found on many plants.—**T. incerta*. Fairly common. A few larvæ found.—**T. stabilis*. Abundant every year.—**T. munda*. One taken, March 21st, 1894.—**T. pulverulenta*. Common in most years, but rather rare in 1895.—**Orthosia macilenta*. A few specimens.—**Anchocelis rufina*. One at treacle, Oct. 13th, 1894.—**A. pistacina*. A few taken in most years.—**A. litura*. A few; also larvæ.—**Cerastis vaccinii*. Common at willows in the spring, but few seen in the autumn.—**C. spadicea*. A few specimens.—**Scopelosoma satellitia*. A few, most of them in the spring, after hibernation.—**Xanthia citrargo*. A few imago. Larvæ fairly common in the garden in some years.—**X. fulvago*. A specimen found dead in the house, Sept. 24th, 1895.—**Tethea subtila*. Two or three; also a larva on aspen.—**Calymnia trapezina*. Fairly common; also larvæ.—**Eremobia ochroleuca*. One specimen in 1886.—**Dianthæcia nana*. One at light, June 29th, 1886.—**D. capsicola*. A few only.—**D. cucubali*. One, June 20th, 1895, at *Epilobium angustifolium*.—**D. carpophaga*? I have one specimen which I believe to be this species; it is the very light variety figured in Newman's 'British Moths,' p. 385, top figure.—**Hecatera serena*. A few specimens.—**Cleoceris viminalis*. One, July 11th, 1894.—**Miselia oxyacanthæ*. One larva found on blackthorn, May 4th, 1894. Imago emerged, Oct. 9th.—**Agriopsis aprilina*. One bred, Oct. 10th, 1885.

Have had several larvæ since, but failed to breed imagos.—**Euplexia lucipara*. Fairly common in most years.—**Phlogophora meticulosa*. Very common every year; also larvæ.—**Aplecta nebulosa*. One taken, June 13th, 1893.—**Hadena protea*. A few at various times.—**H. oleracea*. Very common. Larvæ found on many plants.—**H. thalassina*. Three or four odd specimens.—**Xylocampa areola*. A few only.—**Gonoptera libatrix*. A few taken in the house at various times.—**Habrostola tripartita*. A few at light, in the house.—**Plusia chrysitis*. Fairly common. One, bred June 20th, 1889, has but three wings, the left posterior wing being entirely absent.—**P. gamma*. Very common every year. Swarmed everywhere at end of Sept., 1895.—**Anarta myrtilli*. One taken July 8th, 1892, at rest upon bracken (*Pteris aquilina*).—**Euclidia mi*. Fairly common.—**E. glyphica*. A few. As a rule, these are both in very bad condition, but this seems to be also the case in other districts.—**Catocala nupta*. Common. I take this species more or less commonly at treacle every year in the garden. Scarce in 1894. Over thirty seen in 1895. A few found on aspen several years ago in the garden; it most likely breeds there every year.—**Aventia flexula*. A single specimen taken in a wood, July 6th, 1895.—**Hypena proboscidalis*. Very common.—W. GROVER; Guildford, Nov. 1895. [To be continued].

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*February 5th, 1896.*—Professor Raphael Meldola, F.R.S., President, in the chair. The President announced that he had nominated Dr. D. Sharp, F.R.S., Mr. Roland Trimen, F.R.S., and Mr. Walter F. H. Blandford, Vice-Presidents for the Session 1896–1897. The Rev. John Hocking, M.A., of Copdock Rectory, Ipswich, and Mr. J. C. Moberley, M.A., of 9, Radstock Place, Southampton, were elected Fellows of the Society. Mr. Waterhouse exhibited pupæ and portions of pupæ of a silk-moth, *Antheræa mylitta*, selected from scores of specimens, which he had opened to see if they showed stages of development agreeing with the examples given by Dr. Spuler. The results appeared to confirm Dr. Spuler's researches; some specimens showed the tracheæ, the median vein having two branches, very rarely emitting a third branch in the direction of the radial. Other specimens had faint indications of the veins and of the discoidal spot of the imago. Even at this very early stage the vein branching from the subcostal vein to unite with the upper radial, and the short branch uniting the second median vein with the third median, were distinctly traceable, no tracheæ being yet visible in these branches. Mr. Merrifield, Mr. Hampson, and Dr. Sharp took part in the discussion which ensued. Mr. E. E. Green remarked that in the Trans. Ent. Soc., 1881, p. 601, there was a short paper by the late Prof. J. O. Westwood, describing a curious little insect from Ceylon, under the name of *Dyscritina longisetosa*. Prof. Westwood believed his typical specimens to be immature. Mr. Green exhibited what he supposed to be a later stage of the same species. He said his example differed in some particulars from Westwood's description and figure, notably in the proportions of the caudal appendages. Prof. Westwood pointed out the affinities of *Dyscritina* to the Forficulidæ. This was

very apparent in the specimen under consideration. Putting aside the nature of the caudal appendages, the insect was in all particulars an earwig. The present specimen was taken in the Punduloya district of Ceylon, at an elevation of about 4000 feet. Mr. Green said he had more than once seen this insect under loose pieces of bark and in crevices of rocks, and had always been struck by its likeness to an earwig, both in appearance and habits. Mr. McLachlan, Dr. Sharp, Mr. Gahan, Mr. Blandford, and Mr. Hampson made some remarks on the subject. Mr. O. E. Janson exhibited a Goliath beetle, from the Upper Congo, which he believed to be the male of *Goliathus russus*, Kolbe, described from a unique female example in the Berlin Museum. Mr. Blandford called attention to the case of the eye of a boy affected with inflammation caused by the hairs of the larvæ of *Lasiocampa rubi*; the attack recurred after an interval of nineteen weeks, and in several continental cases this recurrence of the attack had been found to take place, and in some cases permanent injury to the eye had followed. Mr. Blandford discussed the various kinds of hairs on several caterpillars, certain species having hairs of three kinds, one kind being barbed, and thus having the power to work into the skin. He said that the urticating property of the hairs appeared to be mechanical; there was no evidence of any poison glands. Mr. Lawford said he had some difficulty in discovering hairs in the lid, and he thought that the symptoms in the case in question were not to be explained by mechanical irritation alone due to the presence of hairs in the tissues. The subject was a new one to him, and he had looked up all the medical literature bearing on it. Lord Walsingham, Mr. Tutt, Prof. Poulton, Canon Fowler, and Mr. Jacoby made some remarks on the subject. Dr. F. A. Dixey read a paper entitled "On the Relation of Mimetic Patterns to the Original Form." The paper was illustrated by coloured diagrams. Prof. Poulton expressed his gratification with the paper, and with the fact that the Hope Collection under his charge had afforded material for the work. He thought the result of the paper was to give support to the theories of Fritz Müller rather than to those of Bates. Mr. Blandford, Mr. Tutt, and Prof. Meldola continued the discussion. Dr. Sharp contributed a paper entitled "The Rhynchophorous Coleoptera of Japan." Part IV. —H. GOSS & W. W. FOWLER, *Hon. Secs.*

February 19th, 1896.—The President in the chair. Mr. T. Hudson Beare, of Park House, King's Road, Richmond; Mr. William James Kaye, of Worcester Court, Worcester Park, Surrey; and Mr. Charles H. Dolby-Tyler, of the British Consulate, Guayaquil, Ecuador, South America, were elected Fellows of the Society. Dr. D. Sharp exhibited preparations of *Dytiscus latissimus* and *Cybister roesseli*, to show the so-called secondary wing, noticed by Meinert. He stated that this structure is only a part of the elytron, to which it is attached, and that he considered that it corresponded with the angle at the base of the wing seen in so many insects that fold their front wing against the body. He could not consider that this structure afforded any support to the view that the elytra of beetles correspond with the tegulæ of Hymenoptera rather than with the front wings. He also exhibited specimens of Neuroptera, and pointed out that this secondary wing agreed in position and structure with a small lobe on the front wing

of *Raphidia*. Mr. McLachlan, Prof. Meldola, and Mr. Gahan made some remarks on the subject. Mr. C. G. Barrett exhibited, for Dr. H. G. Knaggs, cells of *Retinia resinana* formed of resin but lined with wax. A portion of the cell had been removed and the resin dissolved away with spirit, leaving a slight film of wax (*cf.* Ent. Mo. Mag., Nov. 1895, pp. 251, 252). Mr. Tutt stated that a secretion of wax had been detected by Dr. Chapman in *Parnassius apollo*. Prof. Meldola suggested that as Dr. Knaggs had shown how to separate the resin from the wax it would be of interest to make a chemical investigation of the latter, since a sufficient supply of this material could easily be obtained. No insect wax, with the exception of that of the bee, had been submitted to investigation by chemists. Mr. Hampson and Mr. Blandford continued the discussion. Mr. Gahan exhibited drawings of the dorsal segments of the abdomen of *Dyscritina longisetosa*, formerly described by Prof. Westwood in Trans. Ent. Soc., 1881, a specimen of which was shown by Mr. E. E. Green at the last meeting of the Society. He regretted that no drawing showing the ventral surface had yet been prepared. Mr. McLachlan, Dr. Sharp, and Mr. Green made some remarks on the subject. Mr. B. A. Bower exhibited specimens of *Argyresthia atmoriella*, Bankes, taken in Kent in June, 1894, a recent addition to the British Lepidoptera. Mr. E. E. Green read notes on the habits of the Indian ant, *Ecophylla smaragdina*, Fabr. He said he believed that, at some previous meeting of the Society, Mr. H. N. Ridley, of the Singapore Museum, had made some remarks on this ant and its supposed habit of using its own larvæ as web-spinners in the formation of its nest; but though he had not been able to find anything on the subject in the 'Proceedings,' Mr. Green stated that he was now able to produce corroborative evidence from an independent source. The facts were noted by his friend Mr. W. D. Holland, of Balangoda, Ceylon, a most careful observer. Mr. Green exhibited the specimens referred to by Mr. Holland, and pointed out that the larvæ were still tightly grasped by the jaws of the ants, and he thought it probable that other web-spinning ants utilised their larvæ in the same way. Mr. Hampson said he could confirm this statement. Mr. G. F. Scott-Elliot read a paper entitled "Notes on the Flower-haunting Diptera." The author pointed out that some of the higher types of Diptera appeared to prefer red and blue flowers, and oftener visited the complicated types of plants than the smaller Hymenoptera. He also alluded to the effect of insect visitors in isolating particular individuals. Prof. Meldola expressed himself much interested in the paper, and stated that although he was aware, from the writings of Hermann Müller and others, that Diptera played an important part in the fertilisation of flowers, he was unaware of the very great importance which these insects possessed for the function of pollination until he heard Mr. Scott-Elliot's paper. He also called attention to the urgent need of a manual of British Diptera. Mr. Roland Trimen mentioned that in South Africa some species of Orchidaceæ were fertilized by Diptera. Dr. Sharp referred to Professor Plateau's opinion that neither the colour nor form of the flower played any part in attracting insects. Mr. McLachlan remarked that the flowers of *Scrophularia* possessed a great attraction for wasps. Lord Walsingham enquired whether any observation had been made as to the Diptera

which visited differently coloured flowers of the same species, such as petunias. Mr. Barrett, Mr. Green, and Mr. Scott-Elliot continued the discussion. Mr. Tutt read a paper, by Prof. A. Radcliffe-Grote, entitled "On the Nomenclature of the Geometridæ." A discussion on the rules of nomenclature followed, in which Lord Walsingham, Prof. Meldola, Mr. Hampson, and Herr Jacoby took part.

March 4th.—W. F. H. Blandford, Esq., M.A., F.Z.S., Vice-President, in the chair. Mr. P. Marshall, M.A., B.Sc., F.G.S., of Canterbury College, Lincoln, New Zealand, was elected a Fellow of the Society. Mr. Percy H. Grimshaw exhibited specimens of *Cephenomyia rufibarbis*, Meigen, a new British Bot-fly parasitic on the red deer. He said that the specimens were collected by Mr. L. W. Hinxman, in Ross-shire in June and July, 1894, and in the Cairngorm Mountains in 1895. Mr. C. G. Barrett exhibited, for Mr. Porritt, a black variety of *Polia flavicincta*, taken at sugar in his garden at Huddersfield; a variety of *Cosmia trapezina* with a blue-black central band; and a variety of *Mania typica* with pinkish white central markings, bred by Mr. Turnstall, of Huddersfield. Mr. A. H. Jones exhibited specimens of the following butterflies, captured at Coomassie by Major Henry P. Northcott during the recent expedition, viz. *Papilio zenobia*, *Elymnias bammakoo*, *Limnas alcippus*, *Romaleosoma gausape* (var.), *Catuna cænobia*, *Terias senglensis*, and *Neptis nemetes*. Sir John T. D. Llewelyn, Bart., M.P., exhibited specimens of a small species of Diptera which he believed to be parasitic on *Trochilium spegiforme*, as he had bred a number from that species. He remarked that *T. spegiforme*, although one of the most local and rare moths in this country, had occurred last year on the estate of Sir James Hill-Johnes, K.C.B., at Dolau Cothy, Carmarthenshire, in such numbers in the larval state as almost to destroy the whole of the alders growing there. Mr. G. H. Verrall said that the insects belonged to a species of *Phora*, possibly *Phora rufipes*, which fed on almost everything, but were not considered to be truly parasitic; they seemed blacker than typical specimens of that species. Mr. Hampson exhibited an exotic species of Locustidæ, which Lord Walsingham had found in his conservatory at Merton Hall, Norfolk. He stated that Lord Walsingham had not imported any exotic plants for some years. Dr. Sharp exhibited specimens of the pupæ of *Micropteryx* (probably *semipurpurella*), and drawings to illustrate their structure. The pupæ were sent to him by Dr. Chapman, who had described their peculiarities in the 'Transactions' of the Society in 1893. Dr. Sharp considered the pupa to be that of a trichopterous insect; most of its structures were those of Trichoptera, and the account given by Dr. Chapman of its emergence showed that this was essentially the same as that of Trichoptera. He remarked that the imago of this division of *Micropteryx* had been already shown to approach Trichoptera in several respects, and suggested that it should be treated as a group of Trichoptera whose larvæ are not aquatic in habits. If this course were not adopted, he felt clear that Trichoptera could not be maintained distinct as an order from Lepidoptera. Mr. McLachlan said that so long ago as 1865 he had suggested the close affinity of *Micropteryx* to the Trichoptera; the opinion then formed had since been much strengthened, but he was not disposed to admit co-ordinal relationship. Mr. Hampson, Mr. Barrett, and Mr. Blandford

also took part in the discussion which ensued. Mr. McLachlan exhibited a single instance of monstrosity in a dragon-fly. The insect was a male of *Heterina occisa*, Hag., from Venezuela. On the left side were three wings, two mesothoracic and the other metathoracic; on the right side only one wing, the metathoracic. The supplementary wing on the left side was inserted almost immediately beneath the ordinary wing; it was normal in form and neuration, but the red pigment at the base (fully developed in all the other wings) was not evident, the wing in this respect being similar to those of highly immature examples of the same species. Mr. E. E. Green exhibited a larva of an homopterous insect—one of the Cicadinæ—from Ceylon, having what appeared to be a head at its caudal extremity. He pointed out that the larva had caudal appendages which might be mistaken for hairy antennæ, and pigment spots resembling eyes on the antepenultimate segment of the body. The insect walked either backwards or forwards, and when first seen looked like a beetle of some kind, the caudal extremity representing the head. Mons. Louis Péringuey contributed a paper entitled "Descriptions of New Species of South African Coleoptera, chiefly from Zambesia." Dr. Sharp read a paper, by Prof. Williston, entitled "On the Diptera of St. Vincent, West Indies." Part. I.

March 18th.—The President in the chair. Mr. T. A. Gerald Strickland, of Oakleigh, near Ascot, Berkshire, was elected a Fellow of the Society. Mr. C. G. Barrett exhibited a series of drawings of varieties of British Lepidoptera in the collection of Mr. S. J. Capper, of Huyton Park, Liverpool. The drawings, which were beautifully executed, were by Mr. S. L. Mosley, of Huddersfield, and comprised 389 figures, representing 139 species, of which 33 were butterflies and 50 moths. Herr Jacoby enquired whether any record had been kept of the localities in which these varieties had been caught, or of the conditions under which they had been bred. Mr. Barrett, in reply, stated that none of the varieties exhibited had been obtained by breeding under artificial conditions for the purposes of experiment, but they were all natural varieties due to the influence of climate or soil, or to the latitude of the localities where they were caught or bred. Mr. Porritt added that Mr. Capper had made a special collection of the Yorkshire forms of *Arctia lubricipeda*. Mr. J. J. Walker, R.N., exhibited a specimen of *Procas armillatus*, taken on Durland Hill, near Chatham, during the present month. Herr Jacoby exhibited a specimen of *Loxoprosopus ceramboides*, Guér., from Brazil. Mr. E. E. Green exhibited the eggs of some species of Locustidæ extracted from the stem of a young cinchona tree at Punduloya, Ceylon. He said the species of the parent insect was undetermined; it was possibly either a *Cynatomera* or a *Cyrtophythes*, both of which possess large sabre-shaped ovipositors. A slit, half an inch deep and more than two inches long, had been cut into the hard wood, in which the eggs had been symmetrically deposited, edge to edge, with the coloured part inwards. The greater part of each egg was of fine texture, and coloured green; but at the extremity from which the young insect would make its exit the egg shell was soft, pliant, and beautifully reticulated. The row of flattened green eggs lying side by side resemble an acacia leaf, but as they are concealed within the stem the resemblance was apparently

without motive. It seemed curious that as the eggs were embedded they should be brightly coloured. Mr. McLachlan and Dr. Sharp made some remarks on the subject. Mr. Green read a short paper entitled "*Notes on Dyscritina longisetosa*, Westw." He remarked that drawings of the species had been exhibited by him at a recent meeting of the Society. Dr. Sharp said Mr. Green seemed to think that the insect was an earwig, but he could not accept it as belonging to the Forficulidæ. He thought that further specimens for examination were required before attempting to determine its position, which was quite doubtful at present. Mr. W. F. H. Blandford communicated a paper entitled "Descriptions of New Oriental Scolytidæ."—H. Goss, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*Annual General Meeting.*—Jan. 23rd, 1896.—T. W. Hall, Esq., F.E.S., President, in the chair. The Reports of the Council and Treasurer were read, and showed that the Society still maintains its very satisfactory condition, both numerically and financially. The election of Officers and Council for the ensuing year then took place as follows:—President, R. South, F.E.S.; Vice-Presidents, C. G. Barrett, F.E.S., T. W. Hall, F.E.S.; Treasurer, R. Adkin, F.E.S.; Librarian and Report Secretary, H. J. Turner, F.E.S.; Curator, W. West; Hon. Secretary, Stanley Edwards, F.L.S.; Council, C. A. Briggs, F.E.S., J. H. Carpenter, John T. Carrington, F. W. Frohawk, F.E.S., W. Mansbridge, F.E.S., W. A. Pearce, and H. A. Sauzé. The President then read his Address, which comprised a short *résumé* of the Society's history; notices of the additions to the British insect fauna; an obituary of the year; an epitome of the Society's work during the year passed; and other matters of general interest. Mr. Tutt, on behalf of Mr. W. E. Butler, of Reading, exhibited specimens of *Argynnis latona*, L., said to have been captured in Devonshire by Mr. B. Stafford Chope, and showed from documentary evidence and other circumstances the great improbability of their being of British origin. At the close of the meeting the President announced the munificent donation, by Mr. C. A. Briggs, of the Herbarium which had been formed by the late Mr. W. H. Tugwell.

February 13th.—R. South, Esq., F.E.S., President, in the chair. Mr. Tolhurst, of Beckenham; Mr. E. Montgomery and Mr. A. Montgomery, of Ealing, were elected members. Mr. McArthur exhibited a very long series of *Triphana comes*, Hb., from Hoy, all of them being referable to the var. *curtisii*, Newm., but without black suffusion of hind wings; also a number of extinct, rare, and unique species and specimens of British Lepidoptera, including a series of *Chrysophanus dispar*, Haw.; a pair of *Lasiocampa ilicifolia*, L., two completely banded and one with yellow ground; *Abraxas grossulariata*, L.; the two Killarney specimens of *Notodonta bicolor*, Hb.; the original specimen of *Nyssia lapponaria*, Bdv.; two *Synia musculosa*, Hb.; the specimen of *Hadena peregrina*, Tr., from Lewes; three *Caradrina ambigua*, Fb.; one *Xylina lambda*, Fb. (var. *zinckenii*, Tr.); three *Ophiodes lunaris*, Schiff., one of which was a beautifully-banded var.; the unique *Catocala electa*, Bork., taken by Mr. Vine; one *C. fraxini*, L.; and a series of *Eupacilia gilvicomana*, Zell. Mr. Adkin exhibited a specimen of *Cucullia gnaphalii*, Hb., bred

by the late Mr. Tugwell. Mr. Sturt, specimens of *Sphinx convolvuli*, L., bred from Cornish larvæ. Mr. Frohawk, the contents of a pheasant's crop, consisting mainly of the larvæ of the Dipteron *Bibo marci*. Mr. Moore, an *Ichneumon*, with an extremely long ovipositor, from the Upper Amazon. Mr. Auld, a bred series of *Tortrix cratagana*, Hb., from the New Forest; the pupæ were found spun up in leaves of buckthorn under oaks. Mr. Carpenter, a very large number of *Argynnis paphia*, L., and its varieties. Mr. South, a number of *Argynnidæ* from the Palæarctic region; and read a paper on "The genus *Argynnis*, with particular reference to pale-spotted aberrations. A long and interesting discussion took place as to the cause of this variation.

February 27th.—The President in the chair. Mr. A. H. Waters, B.A., of Cambridge, and Mr. J. A. Lucas, B.A., of Kingston-on-Thames, were elected members. Mr. R. Adkin exhibited specimens of *Hybernina leucophæaria*, Schiff., from Abbott's Wood; the pale and dark-bordered were found in equal proportions, and only one black specimen was taken. Mr. Short, a bred series of *Acronycta myrica*, Gn., with a Dipteron and a series of hymenopterous parasites on its larvæ. Mr. Billups recognised the latter as *Ichneumon fuscipes*. Mr. Dennis, two living females of *Vespa germanica*, taken in February. Mr. Perks, two living specimens of *Rhagium inquisitor*, L., from Epping Forest. Mr. McArthur communicated notes on the occurrence and life-history of *Coccyx cosmophorana* and *Retinia resinella*. He said that the former was always more or less common at Rannoch, where the latter was unknown. As far as he had observed, the larvæ of the former did not in Scotland feed in the way described by Kaltenbach. He was convinced that the larvæ did not normally feed on the refuse of *R. resinella*, but that it did so at Forres he was perfectly certain. A long discussion ensued, during which it was suggested that *R. resinella* had not abstracted all nourishment from its food, which was hence available for pabulum for *C. cosmophorana*, and so presumably the latter species had different habits in different districts. Mr. Billups then read a paper entitled "Hymenopterous and Dipterous Parasites, reared by members of the Society during 1891 and 1892," and exhibited in illustration a large number of species, with the hosts they had preyed upon.

March 12th.—The President in the chair. Col. Partridge exhibited bred specimens of *Phigalia pedaria*, from Epping, of a unicolorous grey with dark nervures; a specimen of *Agrotis puta* having alternate dark and pale bars; and the specimen of *Hadena albifusa* taken by him at Portland, Aug. 15th, 1888. Mr. South, bred specimens of *P. pedaria*, from a black female taken at Macclesfield. The males were nearly of the same form as those of Col. Partridge, but most of the females were black. Mr. Adkin, specimens and sections of the nodules of *Retinia resinella*, to illustrate remarks made at the previous meeting. Mr. Frohawk, bred male and female of *Nyssia lapponaria*, the ova having been obtained from Mr. Christy; the female was alive. Mr. West, of Greenwich, a female *N. hispidaria*, taken in West Wickham woods. Mr. Lucas, a carding spider, taken at Hampton Court. Mr. Barrett, series of various species of the genus *Dianthæcia*, from his own collection, including *D. carpophaga* and *D. capsophila*, from various British localities; *D. barrettii*, with continental *D. luteago* for com-

parison, and the only known Welsh and English examples; * *D. cæsia*, with continental forms for comparison; *D. albimacula*, from Dover, Folkestone and Portsmouth; two drawers from the cabinet of Mr. Sydney Webb, containing the same species, and including the two *D. compta* from the late Mr. Bond's collection. Mr. Adkin also exhibited series of *Dianthæcia*. In the discussion which ensued, Mr. Barrett considered *D. carpophaga* and *D. capsophaga* as one and the same species; he was convinced that *D. barrettii* was but an extreme local form of the continental *D. luteago*, and felt almost inclined to say that there never was a British specimen of *D. compta*. Messrs. Adkin and Tutt preferred to consider the first-named as closely allied species possessing extreme parallelism in their range of variation. Mr. Hall said that he always found *D. carpophaga* larvæ on *Lychnis vespertina* and scarcely any on *Silene*. Various members testified as to the doubtful origin of British *D. compta*. Mr. McArthur gave instances of how *D. conspersa* always resembled the colour of rocks or walls on which it sat in various districts. Mr. Tutt said that *D. cucubali* was the only member of the genus which came to sugar, and that it was also double-brooded.—HY. J. TURNER, *Hon. Report Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—December 16th, 1895.—Mr. Geo. H. Kenrick, F.E.S., in the chair. Mr. J. T. Fountain, 58, Darwin Street, was elected a member of the Society. Exhibits:—By Mr. R. C. Bradley, fine specimens of *Æschna juncea* and *Æ. grandis* from Sutton Park. By Mr. Kenrick, a few Lepidoptera taken during a short trip on the Norfolk Broads. He had gone in a wherry, and collected chiefly by means of light from the boat; amongst the things taken by this means were *Leucania albipuncta*, *Nonagria despecta*, and *Calamia phragmitidis*; he also tried sugar with poor results, the best take being *Apamea fibrosa*. He also showed a pair of small dark *Plusia festuæ* he bred from larvæ found there.

January 20th, 1896.—Mr. P. W. Abbott, V.-P., in the chair. Exhibits:—By Mr. Abbott, *Notodonta dodonæa* from Wyre Forest; a fine dark female *Nonagria typhæ*, one of two bred from a large number of pupæ taken in Norfolk by himself and Mr. Hodges last year; also pale male *Odonestis potatoria*, also from Norfolk, only a little darker than normal females. By Mr. R. C. Bradley, *Erigone vagans*, a handsome Tachinid, which he took in Sutton Park in June, 1885, flying round the pines in company with great numbers of other insects; there were many Tipulidæ, bees, &c., and the flowers seem to have been quite deserted for the pines. He believed the attraction to have been the resinous exudation, as he could find no trace of honey-dew or other likely attraction. By Mr. Wainwright, *Micros*, including *Stenia punctalis* from Boscastle, Cornwall. By Mr. Martineau, six cases of Hymenoptera from his collection, containing many fine and interesting things.

February 3rd.—Seventh Annual Meeting.—Mr. G. T. Bethune-Baker, President, in the chair. Mr. C. A. E. Rogers, of 31, Hall Road, Handsworth, and the Wells House, Malvern Wells, was elected a

* Some doubt was expressed, after the meeting, as to whether the Welsh and English specimens in the series of *D. barrettii* were really referable to that species.—ED.

member of the Society. The Annual Reports of the Council, the Treasurer, and the Librarian were presented, and were duly received. The following were elected as Officers and Council for the ensuing year: as President, Mr. G. H. Kenrick; Vice-President, Mr. G. T. Bethune-Baker; Treasurer, Mr. R. C. Bradley; Librarian, Mr. A. H. Martineau; Honorary Secretary, Colbran J. Wainwright, 147, Hall Road, Handsworth, Birmingham; remaining members of Council, Messrs. P. W. Abbott, W. Harrison, E. C. Rossiter, and G. W. Wynn. Exhibits:—By Mr. J. T. Fountain, a beautiful specimen of *Arctia caia*, all the red being replaced by cream colour, and the white of fore wings much extended; also one with the dark colour much extended. By Mr. P. W. Abbott, a row of *Mamestra furva* from Bay of Nigg, N.B. By Mr. W. Harrison, some nice *Catocala sponsa* from the New Forest. By Mr. R. C. Bradley, three species of *Loxocera*, a series of *aristata*, Panz., a pair of *albiseta*, Schrank., and a pair of *sylvatica*, Meig., all from Sutton, *L. sylvatica* being quite new to the British list.

February 17th.—Mr. A. H. Martineau in the chair. Mr. Kenrick having again expressed his inability to accept the presidency, Mr. G. T. Bethune-Baker was re-elected President, and Mr. P. W. Abbott, Vice-President. Exhibits:—By Mr. R. C. Bradley, a specimen of the rare *Xanthogramma citrofasciata* from near Droitwich. By Mr. J. T. Fountain, nice variable series of *Bombyx quercus*, *Odonestis potatoria*, and *Abraxas grossulariata*; the *potatoria* were from Droitwich, and the males showed a tendency to paleness, one approaching the females closely in colour; one *grossulariata* had almost lost the black markings on the hind edge of the hind wings; it was one of a brood reared on *Pyrus japonica*, all of which were pale; others he reared on hazel came out dark. By Mr. W. Bowater, *Sesia scoliiformis* from Killarney; also a pupa-case of *Zeuzera æsculi* found in a saw in his garden at Edgbaston. By Mr. Wainwright, a number of rare Diptera, *Cheilosias* &c.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

RECENT LITERATURE.

Handbuch der paläarktischen Gross-Schmetterlinge für Forscher und Sammler. Von Dr. M. STANDFUSS. Jena: Gustav Fischer. 1896.

THE author of this important work has had two distinct purposes in view: the first being to provide a full practical guide for the collector of butterflies and the larger moths; the second to infuse some scientific spirit and interest into the work of collecting, by showing from his own observations and experiments how much light may be thrown, by a practical entomologist working on good lines, upon some of the most doubtful and difficult problems of biology. There can be no doubt that Dr. Standfuss has amply succeeded in demonstrating the importance of entomological evidence in the vexed questions concerning heredity, the origin of variations, and the general laws of species-formation that have been for long, and are still, so keenly debated; and if his numerous carefully-planned and elaborately carried out experiments should fire other entomologists with the desire of emulating his achievements, the book will have performed a

great and lasting service to the cause of science. Dr. Standfuss's experiments, the main results of which are illustrated by a series of excellent coloured plates, some of which reach a very high standard of beauty and accuracy, are chiefly concerned with the subjects of hybridisation and of the alterations produced in the perfect form of insects by the exposure of their immature stages to abnormal physical conditions, mainly those of temperature. There can be no two opinions as to the industry and thoroughness with which the author has addressed himself to the task, nor will there be any question that the results he has obtained and recorded are in the highest degree interesting and valuable. It is equally certain, however, that his interpretations of the facts will be in many quarters vigorously called in question, as will appear when we mention that he upholds the doctrine of the transmission of acquired characters (pp. 336-344), and that he is disposed to minimise the value of natural selection in species-formation (pp. 286-292, 3). It would be beside our present purpose to enter into a criticism of our author's views on these points; we will simply content ourselves with remarking that he does not seem to us to have shown that the characters impressed upon individuals by direct action of the environment are capable of transmission, unless in the limited sense allowed by Weismann ('The Germ Plasm,' 1893, p. 401), which, strictly speaking, does not involve heredity at all. We may say also in passing that we cannot help thinking that a careful consideration of the phenomena of insect-life in other regions than the palaearctic—say the neotropical—would lead him to adopt a somewhat more sympathetic attitude towards the question of mimicry than that expressed on pages 295, 296. Be this as it may, the experimental portions of the work form a storehouse of valuable material; and the author certainly deals fairly with his readers by presenting the evidence he has collected in a full and un mutilated condition.

English entomologists will be pleased to find that Dr. Standfuss cordially recognises the value of the work of Mr. Merrifield, much of which in many respects anticipated his own. The remarkable results obtained in this country by the last-named investigator with various members of the genus *Vanessa* and other Lepidoptera by exposure in the pupal stage to abnormal conditions of temperature, were unknown to Dr. Standfuss until the close of his own experiments; and the fact that the independent descriptions by each author of the effects produced are so closely correspondent, forcibly testifies to the accuracy of the observations of both.

We note that Dr. Standfuss, though he is firmly convinced that both heat and cold are capable, in different species, of inducing reversion, does not allow that this result may follow the application of either heat or cold in the same species. Reasons for thinking that, in some cases at any rate, the changes produced in the same species by both raising and lowering the temperature are reversionary, have been put forward by the present writer; and Dr. Standfuss does not give us his grounds for declining to accept them. The author's speculative views as to the phylogenetic and distributional history of the *Vanessas* and other groups are always interesting, and often convincing.

The practical portions of the work, which are in most respects a reissue of the author's former 'Handbuch für Sammler der europäischen

Gross-Schmetterlinge' published at Guben in 1891, form a complete and useful guide for the continental collector, and *mutatis mutandis* would supply valuable hints to the field entomologists of our own country. Among the subjects dealt with in a more or less original manner are the various modes of larva-collecting by searching, beating, sweeping, the laying down of dry foliage, &c. Under the heading of the perfect insect we have sections devoted to nets, killing-bottle, collecting-boxes; mallet for jarring tree-trunks; methods of collecting by smoke, light, and baits; the packing, pinning, and setting of captures. Good practical directions are given for the rearing of larvæ in all their stages indoors or in the open, with fairly full accounts of the diseases to which both larvæ and pupæ are liable. Useful hints are added as to the management of such species as hybernate in the larval or pupal condition, and as to the precautions to be adopted against the attacks of "cannibals."

The author has also much to say with regard to the care of the collection itself, nor do such details as the subjects of purchase and exchange, the arranging and labelling of specimens, and the keeping of a memorandum-book and register, fail to find mention in their appropriate place. The advice given throughout is of a sound and practical character, and the author commands the greater confidence in his recommendations from being able to appeal at almost every turn to the results of his own experience. We take leave to differ from him on one minor point. He deprecates the waste of time, as he considers it, involved in making a separate record of each individual specimen in the collection. We hold, on the other hand, that it is most important to be able to give the exact date and locality of each capture when required, together with any other points of interest that may have been observed in connection with it at the time. Such facts often turn out to have a quite unexpected bearing on some question of biological interest, and their systematic record adds enormously to the scientific value of the collection.

We cannot close our notice of this stimulating book without bestowing a special word of praise on the coloured figures, which, excellently drawn by L. Schröter and worthily reproduced by the well-known firm of Werner and Winter at Frankfort, are both good in themselves and really useful as illustrations of the text. Those that especially take our fancy are the hybrid Saturnias, with their larvæ, Plates I.-IV. The Vanessas on Plates VI. and VII. are most interesting, and should be compared with Mr. Frohawk's figures accompanying Mr. Merrifield's papers in the London Entomological Society's 'Transactions.' There is, we think, an inaccuracy in Plate VI., fig. 4. The last of the chain of pale submarginal spots should belong to the space between the first and second median branches; not, as here represented, to the space between the median and submedian nervures.

The book would be improved by a good subject-index, for which the fairly full table of contents at the beginning, and the alphabetical list of genera and species at the end, are a not quite adequate substitute. It is to be hoped that this want may be supplied in the future editions, for which the high merits of the work are likely to ensure a demand.

F. A. D.

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[No. 396.

BOARMIA CINCTARIA, AB.



THE above figure represents a beautiful aberration of *Boarmia cinctaria*. In the strongly contrasted coloration it bears a close resemblance to the striking banded forms of *Hybernia leucophearia* var. *marmorinaria*.

The primaries have the basal and marginal areas of a dark dusky brown; the median band white, slightly streaked with brown, and the usual central oval black marking; the secondaries are similarly coloured, having the basal half and apical portions white dusted with brown.

The specimen was captured in the New Forest in 1893, and is in the collection of Mr. Joseph H. Carpenter, to whom I am indebted for the loan of it for figuring.

F. W. FROHAWK.

BROCKENHURST REVISITED.

By the Rev. O. PICKARD-CAMBRIDGE, M.A., F.R.S., &c.

FEW spots have been less transformed by the march of events than a portion at least of the old entomological collecting ground at Brockenhurst in the New Forest. This came as a pleasant surprise to me on going over the well-remembered spot during the past summer. I had heard, since my early visits, that numbers of the old oaks in the fine forest-grove leading towards Lyndhurst had disappeared, and that I should find it all changed for the worse. My first visit was in June, 1854; my concluding trip there at that epoch was in June and July, 1857. My surprise therefore in June, 1895, was only equalled by my gratification at finding, with scarcely an exception, every well-remembered tree, nook, and glade just as they were at those early dates. There were the old, almost jet-black "sugaring" patches on the identical tree-trunks; the smooth closely-cropped "lawns" melting away into the dense undergrowth of bracken, over which the broken sun's rays dropped in chequered sheen. I almost expected to see the ever-welcomed sight of my old friend and companion in those visits, Frederick Bond, clad in an old brown-holland jacket, a short umbrella-net in one hand, and a six-foot beating-stick in the other, hammering away at the oak-trunks and lichen-covered limbs, and to hear his cheery voice asking, "Have you got any more *viduarias*?" Those were indeed pleasant days—with a growing collection of Lepidoptera to be worked for, in a locality of traditional entomological richness, and in company with one of the heartiest, most unwearied, and most unselfish of collectors.

Circumstances prevented my visiting those parts again until the past year. I believe Mr. Bond worked on there again at intervals for a time, though I fancy his subsequent work in the New Forest lay in the more immediate neighbourhood of Lyndhurst, where, indeed, I myself worked for some weeks during the summer of 1858, but not with Mr. Bond. I understood, when there last summer, that this particular Brockenhurst locality has now become chiefly the hunting-ground of the railway-excursionist collectors, school-boys, "goodness-gracious" young ladies, and such like entomological aspirants. One of the first human beings I saw during a twilight stroll through the old ground was a well-remembered form (only differing by the accretion of the forty odd years), pioneering two ladies and a gentleman, whose movements and methods betokened the diurnal and macro-lepidopterous state of mind. My old friend (I call him *friend*, for all collectors are, or ought to be, friends, though at that time I only knew him by name and sight) was the bearer of a huge net for beating larvæ into, and also of the usual "sugaring"

materials. I recognized him (though he did not recognize me), and asked him what sport? "None! nothing out scarcely! One 'crimson' by some other lucky party last night." He bewailed by their trivial names various of the old stock insects that used to be got there; and especially the absence or rarity for several years past of *Dicycla oo*, which he told me occurred there in the greatest profusion some years since, one collector taking upwards of two hundred. This was new to me, for during my visits Bond and I both took it but rarely. I asked him if *Cleora viduaria* was ever taken there now, but neither by this name, nor by its trivial name "the pretty widow," nor by the description I gave him of it, did he know of its having occurred there. I subsequently heard from a local collector there, Mr. C. Gulliver, that it had not been taken for a great many years. It was unknown to the latter, and, indeed, he did not know the exact locality where it used to occur, nor the method of working for it. This I suppose accounts for the long price that this pretty moth fetches when now brought into the market; but I would ask whether any serious collectors do now ever work for it in the right place, in the right way, and at the right time? The spot where I and Bond took it in tolerable abundance appeared to me to be quite unaltered, with nothing so far to lessen the likelihood of its occurring there now; and its food (supposed, I believe, to be the lichens on the old oaks) is certainly still in abundance. Yes, the days of the "pretty widow," and "Jephtha's daughter," the "scarce marvel du jour," *Triphæna subsequa* (with a long *e*, after old Charles Turner's rendering of it), and many more, were pleasant days; but if the "pretty widow" be no longer there, the pleasure of those days can, in their fulness, of course, never more return. Still I think she can only be in hiding! *this*, however, is not, I fancy, generally considered to be the habit of those of whom the sapient Mr. Weller bid Samivel "beware!" During my first visit to the Forest, in June, 1854, I met with two specimens of *Cicada hæmatoides*, and another, or others, were taken by Mr. Bond, all on the wing in bright sunshine among the fern (bracken). Whether or no this was its first occurrence in England I cannot say. The authors of 'The New Forest,' Rose C. de Crespigny and Horace Hutchinson (London: John Murray, 1895), p. 278, state that this insect "was first taken in the Forest by the late Mr. Farren in 1858," which is manifestly a mistake. At p. 275 of the same work it is also stated that "one hundred and twenty-five specimens of *Triphæna subsequa* were captured in one season" [year not mentioned] "by Mr. Gerrard of Lyndhurst." Was this, I wonder, ever recorded in any of the entomological periodicals? We also read there that the natives of the Forest style "the man with a butterfly-net a bug-hunter!" I have usually heard entomologists called by country people in

England generally, and in the Forest certainly, "flycatchers," but never a "bug-hunter"; the Americans call him a "bug-sharp!" In the same work, at p. 268, it is said, "The greatest find ever made in the Forest was the *Niobe* fritillary, in 1869, by Mr. Gerrard." Was not the so-called *Niobe* afterwards ascertained to be only a variety of *A. adippe*?

I have mentioned above the name of Charles Turner,—probably not many entomologists of the present day were acquainted with him. His was a well-known figure during the "fifties" in this part of the New Forest, where he was usually known as "the Grasshopper," and a most hard-working, acute, and successful collector, chiefly of Coleoptera. He did, however, a fair amount of work among Lepidoptera. His only sleeping-place for weeks together was a ruined, open shed under the plantation on the right hand going from Brockenhurst to Lyndhurst. Here he would lie down for a few hours after sugaring, and be about again beating for larvæ at daybreak. As soon as funds ran short he would pack up his collections and take them to London, where they were eagerly hailed by many well-known entomologists, and met a ready sale at good prices. In all his entomological work Turner was thoroughly trustworthy; I never heard even a suspicion raised as to the genuineness of any of his New Forest rarities. I have heard of his receiving as much as thirty or forty sovereigns for one cargo of insects. On this money he would revel in London until it was spent, or he was robbed of it, and then back to the old work in the Forest with as great zest and love for it as if his insects had been duly stored in a private cabinet awaiting his fresh additions; he indeed loved the work and the open air and surroundings of the Forest in a truly remarkable degree, and quite apart from its being his means of living, or the high prices he got for his captures,—I have myself known him to get 15s. each for a dozen *Triphæna subsequa* (considered a heavy catch of that moth in those days). He was, however, very close and wary as regards divulging the localities of his insects, which is not to be wondered at, as his livelihood depended on keeping them to himself,—some of his localities for rare Coleoptera have, I believe, never been since discovered. He also had his own ideas of the laws and customs of "collecting." On one occasion three of us had just sugared in the rides in the plantation at the top of the rising ground on the right hand between Brockenhurst and Lyndhurst, and were waiting about until dark enough to light our lamps, when, more than half tipsy, "the Grasshopper" came up, gesticulating, and threatening to prod out every eye amongst us with the sharp end of his net-stick—a formidable ashen staff of at least six feet long—because we had, he said, taken possession of his rides. Argument was useless; no one had been on the ground during the whole of the afternoon and evening but ourselves, and there

was nothing to prevent our working there for the night ; but it appeared that he had worked there the night before, and so claimed to keep everyone else out of these rides as long as he chose. The noise of the strife soon attracted several other collectors from a distance, and the row became worse and worse. Just at this juncture up came one of the Forest plantation keepers and tried to quell the disturbance ; but after some fruitless expostulations, and bewailing the mistake he had hitherto laboured under, that we “flycatchers were a peaceful set of beings,” he suddenly asked what right any of us had in the plantation, inasmuch as those portions of the Forest were specially closed to the public by the “Ranger’s orders,” and he added that he must beg all who had not a special written permission from the Deputy Ranger to clear out of the enclosure forthwith. This stopped the babel of voices like the falling of a bombshell in our midst, and after a demand for each and all to show his written permission, it so turned out that Turner was the only one out of the ten or twelve collectors then gathered together who possessed the Deputy Ranger’s written permit. There was no help for it ; we had all to beat a retreat in as dignified a way as we could, leaving “the Grasshopper” in sole possession. The next morning I made it my business to call upon Mr. Cumberbatch, the then Deputy Ranger, living at Lyndhurst ; and, after hearing the account of the previous night’s occurrence, he gave me a written permission, which I still have in my pocket-book, though I was never again interrupted, and never asked to produce it !

Pleasant indeed it was to revisit those old haunts of forty years ago ! I missed the “black-veined white” butterfly, then abundant at that part of the Forest. It is difficult to conjecture even the cause of its disappearance. No tale has ever been told of its merciless extermination by collectors ; the whitethorns are there still, the direct descendants doubtless of those among which William Rufus may have ridden in the chase ;—some of these said whitethorns are indeed pictures of scraggy, mossy old age and decay, and may well be a thousand years old—why then has *Aporia crataegi* disappeared ?

My present visit, however, was not just to go over the old ground for the mere sake of the old associations, nor yet to collect Lepidoptera, but to work for several local and rare spiders, of which my friend, Mr. Cecil Warburton, of Christ’s College, Cambridge, had the previous summer come across some stray specimens. After working in the thickest brakes of black and white thorns, at the cost of an umbrella, a net or two, and much damage to our garments, my nephew (F. Pickard-Cambridge) and myself succeeded in finding all but one species during the June visit. The best of these, *Hyptiotes paradoxus*, Koch (only once, before Mr. Warburton met with it, recorded in Great Britain), was not yet in the adult state ; a second

trip, however, in July, after still harder work, and just on the point of giving it up, I met with adults of both sexes. Another rare and local species, *Epeira angulata*, Clerck, was fairly abundant in the same locality; and, in addition to many other good things, I turned up a pretty little *Philodromus* new to Britain, *P. rufus*, Sim.

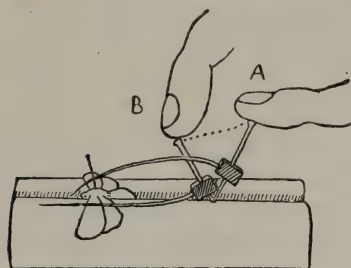
In the July visit we did more among the Lepidoptera, taking some good micros, a few of which are not readily met with elsewhere. Tired out with beating the old thorns and oak-boughs, we (my son, A. W. Pickard-Cambridge, and myself) threw ourselves down on a shady bit of close-cropped lawn on the high ground looking over towards Southampton and Beaulieu. Old gnarled oak-trees stood out on all sides, anything like straight lines being broken by clumps of oak, ash, beech, yew, thorn, and other lesser undergrowth; vistas of exquisite beauty opened out in various directions, such as no landscape-gardener could even dream of, still less achieve; the sun shone brilliantly, the heat was great, but there was up there a refreshing breeze. There we rested, eating our sandwiches, and talking of those ancient times when, may be, down that very bit of lawn, William Rufus and his followers in hot pursuit of deer may have ridden. No sound was to be heard excepting the hum of the humble-bee, the chirp of the grasshopper, and the gleeful clapping of leafy fingers among the trees; no human being was in evidence any more than if none existed in the country. Well! we did not see either the red king or his ghost, nor yet any of the deer descended from his herds—more's the pity that they are all gone; but as we sat and munched and talked and pondered on things new and old, an old fox trotted out close in front of us, and cantered leisurely down the lawn and away. The conclusion was not sublime certainly, still less was it ridiculous: we laughed! I jumped up hastily: "Oh! oh! goodness gracious! murder! thieves!" No, not thieves, only emmets! I had been sitting on what I thought a deserted emmet nest; but the spell of my presence, or the attraction and weight of my person, had called up an unseen host from subterranean regions, and I was covered with the little tickling rascals.

Yes, those were pleasant days there forty years ago, and more than pleasant to revisit the old spot, and to experience in even a greater degree than ever the anticipations, fulfilled and unfulfilled, the excitements, and the satisfactions of one of the most absorbing of earthly pursuits, Entomology, pursued in one of the grandest of British localities, the New Forest.

Bloxworth Rectory.

“SPANNERS” OR SETTING BRISTLES.

By H. GUARD KNAGGS, M.D., F.L.S.



“SPANNERS” are invaluable to the collector for the purpose of setting out Lepidoptera, an operation which they greatly facilitate. Their use is, firstly, to assist in getting the wings into position; and secondly, to hold them in their place until suitable braces have been applied. The instrument under the finger at A in the figure will give an idea of what a spanner is, and how it is put together, thus: a stout pin is passed through one side of a quarter-inch cube of silver cork, or cork carpet, so as to come out on the opposite side, and is then withdrawn in order to allow of the insertion of a bristle, represented in the figure by a cat’s whisker, the last quarter inch of the thick end of which has been twice dipped in varnish in order that it may be firmly fixed in the cube; a pin (a bead-headed steel toilet-pin being neatest and most convenient) is then driven through two other opposite sides of the cube, crosswise to, and at an angle slightly obtuse to, the bristle, care having been taken that the concave curve of the latter faces downwards.

Nothing, so far as I know, has yet been introduced as a spanner to beat the well-formed whisker of an old tom cat. It was, I believe, the invention of my old friend Bond; it superseded bristles and fibres from brooms and brushes, and cut quills (excepting for the larger insects), and has been adopted by most of our best collectors during the past half-century. About forty years ago my old friend Fereday tried to persuade us to use a fine “beading-needle,” as fine as a hair, but its action was comparatively harsh, and the material was not sufficiently flexible and springy, so that it did not catch on.

The qualities desirable in a spanner are roundness, smoothness, and flexibility with stiff springiness; the cat’s whisker not only possesses these in high degree, but is so graduated, in thickness and strength, that, within certain limits, any required pressure can be applied at will, from the gentlest touch of the point to the most delicate micro, to the firm grip, by the stouter portion, on the wings of a good-sized insect. Its manipulation, of course, like everything else, wants a little judgment and

practice, but proficiency is easily acquired, after which, use becomes second nature, and we henceforth swear by the smeller of grimalkin.

The action of the spanner is as follows:—Having the specimen we desire to set in a lissome condition, properly pinned, the thorax and abdomen resting in the groove of the saddle, with the legs placed in position, and the shoulders of the wings, when depressed, all but touching the surface of the cork or cork carpet, the bristle of the spanner is held over the wings of the left side, the point of the pin being steadied in the saddle behind the insect, as near to the groove as possible, the tip of the bristle resting in front, so that the spanner is parallel with the body of the insect; then the finger (at A in the figure), placed lightly on the pin-head, is advanced towards B till the fore wing is pressed nearly but not quite on to the cork, while by gentle leverage and pushing by means of a setting-needle with the point placed under the fore wing (generally a darning-needle stuck eye foremost into an inch or two of penholder), the wing is got up to its proper level; the finger now advances towards B again, and simultaneously the pin-point is pressed a little way into the cork of the saddle—this action grips the costa of the fore wing and holds it in position; lastly, the hind wing is pushed into position, the finger again advanced to B, the point of the pin being driven still more deeply into the cork. Thus, as shown in the figure, the wings are held firmly. Of course, if for any reason we require to relax our grip, all that is necessary is to retreat the finger towards A. Operate on the right side of the insect in the same way until the two sides are symmetrical, and the specimen is then ready for the braces, which are merely squarish pieces of tracing-paper of sufficient size to cover the wings and leave a margin for pinning. Transversely ruled paper is of great assistance in getting the wings level, but in the present day most collectors prefer to trust to the eye, having a strong objection to cover their saddles with paper of any kind, believing that it tends to harbour *Acari*, and to prevent the necessary occasional disinfection of their saddles. If the lines could be printed on the bare cork or cork carpet it would certainly be an improvement.

The quills, bristles, and whiskers of the animals at the Zoo have for some time engaged my attention in the hope of finding something to go one better than Tom's whisker, but all I can offer in the way of advance is that the whisker of the common seal is admirably adapted for setting large things, as also is the stout end of a lion's whisker, the thin end does for smaller things. I have a few lion's and tiger's whiskers by me, and propose to make them up into spanners, a sample of which I shall be happy to forward, so long as my stock lasts, to anyone who will send me a stamped directed envelope within the present month—May.

London, April 13th, 1896.

NEW EXPERIMENTS ON THE SEASONAL DIMORPHISM OF LEPIDOPTERA.

By DR. AUGUST WEISMANN.

(Translated from the German by W. E. NICHOLSON, F.E.S.)

(Continued from p. 113.)

IV. EXPERIMENTS WITH PARARGE EGERIA AND MEIONE.

The satyrid, *Pararge egeria*, L., which in our woods has two quite similarly coloured broods, occurs, as is well known in the South of Europe, in a golden-brown form instead of the whitish-grey form, which has been described as var. *meione*. Both forms are figured in my old paper of the year 1875, on pl. 2, figs. 23 and 24; and it is, indeed, also stated there that the extreme *meione*, as it occurs in Corsica, Sardinia, and Sicily, is connected with the German *egeria* by an intermediate form, whose habitat is on the Ligurian coast, and which, indeed, is considerably yellower and darker brown in colour than *egeria*, but yet has not the complete brilliancy of the Sardinian variety.

It was a question with me to know, whether both these forms are wholly temperature forms in the sense that one owes its appearance to the direct influence of the southern heat, *which at present exists*, the other to the influence of the northern tempered warmth, *which at present exists*. If this was the case, then a brood of *meione* reared under the cooler German climate must produce the German form of the species *P. egeria*; and, on the other hand, a brood of German *egeria* reared in the south must produce the golden-brown butterfly of the var. *meione*. But if the influence of the climate is such, that it alters the germ, then the experiment must give another result; the golden-brown variety of the south must still always exhibit in its progeny the characters of *meione* entirely or in part, although they were reared under a northern sky; and, on the other hand, the progeny of the German *egeria* can no more reach the golden colour of the *meione*-form by high temperature during the pupal period.

I have conducted both experiments, and the result was decisive, notwithstanding the many deficiencies, which always attach to such experiments. I regard it, for instance, as one of such, that I was not able to conduct the first-named experiment with the extreme *meione*-form, but with the *meione* of the Riviera, which is less strikingly different from the German *egeria*.

First experiment with egeria.—24 eggs were laid by a female *meione* captured at Genoa, which hatched on April 21st, 1884, at Freiburg, at a room temperature of 17° C. They fed on various grasses (*Triticum repens*, species of *Poa*), and were placed on a *Poa* grown in flower-pot covered with a bell-glass, and kept in

the room until the first moult. This took place on May 5th and the following days at a temperature of only 10° C. As soon as the weather became warmer, the larva-cage, in which the young larvæ were now being reared on living grass with free access of air, was brought into a well-lighted but cool cellar, where the temperature was always $12.5-14^{\circ}$ C. Strictly speaking, the rearing might have been carried on at the actually prevailing heat of $25-27^{\circ}$ C., to which, indeed, our indigenous *egeria* are subjected; but the other method was chosen, in order to obtain as distinct a result as possible.

The larvæ grew very slowly; they were only 12-13 mm. long on May 28th, and their pupation took place between June 17th and 25th. They produced 15 pupæ, which were left in the cellar at a maximum temperature of 14° C. Shortly before emergence the temperature rose somewhat, but only up to $17-19^{\circ}$ C., consequently far from our highest summer temperature. There emerged:—

On July 12th, 1 butterfly.
„ 13th, 5 butterflies.
„ 14th, 5 „
„ 15th, 2 „
„ 17th, 3 „

—
Altogether 16 butterflies:

8 of them males and 8 females, all smaller and less brightly yellow than those which had been captured at Genoa in March and April, but all at the same time distinctly more brownish in the ground colour and yellower in the spots than specimens captured at Freiburg or elsewhere in Germany. There is no doubt but that a brood of *egeria* from Germany would have produced *paler* butterflies, if they had grown up under closely similar conditions. But the force of this argument is still stronger from the following experiment.

Second experiment with egeria.—From 20 eggs of an *egeria* from Zürich, which were laid on May 20th, 1886, there emerged 20 larvæ at 19° C. on May 30th, which on May 31st were placed on living grass in a hot incubator at $25-27^{\circ}$ C. On this account the larvæ were very active; they ate much and grew rapidly, so that they had all got over the first moult as early as June 1st. The temperature was not always quite constant, but sank on June 5th to 24° C., then rose again on June 7th and 8th to 25° C., and remained so. On June 9th the larvæ measured 1.5 cm.; on June 13th the largest was 1.8 cm. I found three pupated on the 18th, three more on the 21st, one more on the 24th, and the last on the 25th. On June 5th, on changing the grass, as it had to be done from time to time, three larvæ remained unnoticed on the old plant, which was placed in the

room. They grew up afterwards therefore at the room temperature ($18-19^{\circ}$ C.), and developed much more slowly than the others. On June 21st, when six of the latter had already pupated, these were only half-grown, and they first pupated on July 2nd. There were therefore reared:—

A. In the incubator, at about 25° C., 9 pupæ.

B. In the room, at about 18° C., 2 pupæ.

The former pupated after 20–27 days, the latter after 34 days. The butterflies emerged:

From A, in the incubator, at 27° C.:—

On June 27th,	1
„ 28th,	4
„ 29th,	1
On July 2nd,	1 female.
„ 4th,	1
„ 7th,	1
—	
Together	9

From B, at the room temperature:—

On July 12th,	1
„ 15th,	1

Consequently the development from egg to butterfly had lasted 44–47 days at the room temperature (18° C.), and 29–39 days at the higher temperature

The butterflies of Lots A and B are *exactly alike*; neither could be distinguished in colouring and marking from such as were caught in the open.

Result of the experiments with egeria.—The southern form *meione* can, indeed, be influenced by the action of a lower temperature ($10-14^{\circ}$ C.) in its colouring, and be rendered less brightly coloured; but still they always remain brighter in colour than the northern form *egeria*. On the other hand, a brood of the northern form is not visibly altered by the action of a higher temperature (25° C.). I should have liked to repeat this experiment with a still greater increase of the temperature up to about 35° C., but hitherto I have not accomplished it. Nothing, however, in the main result would be altered by this.

V. EXPERIMENTS ON THE EFFECT OF VARIOUSLY-COLOURED LIGHT ON THE PUPÆ OF LEPIDOPTERA.

It has already been frequently stated, that the quality of the light exerts a direct influence on the colours of butterflies. Now, although the colour-decoration of a butterfly is ready, when it breaks through to the light from the dark pupal integuments, yet it seems to me worth the trouble of testing by experiment

the opinion, which might be held, that light influences the formation of colour in the wings of butterflies through the pupal integuments.

The experiments were carried out ten years ago, and their purely negative result made a description of them appear to me superfluous. I describe them solely that this question may be set at rest; and I do so, although I now see that Dr. Standfuss has undertaken and published similar experiments, in which the result was likewise negative.*

Experiments with Vanessa cardui, 1884. — A female of *V. cardui*, captured in the open near Freiburg, laid numerous very small green eggs on a thistle on May 27th, 1884; they were all laid singly on the under side of the leaves and on the stem, but often several (up to nine) scattered on the same leaf.

The emergence of the larvæ took place between June 4th and 6th, with exclusion of the light under a black bell-glass. The larvæ which had emerged were then divided into three groups, the first of which remained in darkness, the second was reared under blue light, and the third under yellow light.

All of the third group escaped through an opening, and had to be replaced by five larvæ from the first group on June 19th; and, as these died in the yellow light, they were again replaced on June 21st by some of the first group.

The larvæ of all three groups then developed equally well. All the larvæ of the second group pupated on July 3rd, all but one of the third group on July 4th. The larvæ reared in darkness did not pupate until July 8th. However, this cannot be attributed to the light without further proof; it was rather only a result of worse, *i. e.* slower, nutrition. The box, in which this group was reared, was, indeed, only closed by its lid, and not with a glass plate, as in the second and third experiments. To be sure, a thick cloth lay over this, but still the evaporation was great, and caused the food-plant to dry rapidly. The renewing of the food-plant, too, always brings about a kind of fast, as the larvæ are very sluggish, and do not readily crawl of their own accord from the withering leaf, although a fresh one lies close by, or even *just over* it. They then, indeed, spin both together, but they eat the withered one again notwithstanding. They are not adapted to a change of food, but to remaining stationary on the same plant. The butterflies emerged—

1st Group, in the dark.	2nd Group, under blue light.	3rd Group, under yellow light.
On July 13th, 2	On July 9th, 1	On July 11th, 5
„ 15th, 2	„ 10th, 4	two of which were crippled.

* Standfuss, Handbuch für Sammler europäischer Grossschmetterlinge. Guben, 1891, p. 119.

These 14 butterflies are not in any way different from other Freiburg *cardui*, neither do they differ among themselves in marking or colour, apart from quite insignificant individual differences, such as are never absent. All 14 have relatively much blue in the eye-spots on the under side of the hind wings.

(To be continued.)

SILK-PRODUCING LEPIDOPTERA.

BY ALFRED WAILLY.

(Membre Lauréat de la Société Nationale d'Acclimatation de France).

IN consequence of the enormous losses experienced in the production of the mulberry silk, during a number of years, owing to the various diseases which attacked the *Bombyx mori* worms, the attention of sericulturists of various countries was drawn to several species of wild silkworms of Asia, America, and other parts, and experiments were made in Europe, with more or less success, with the oak silkworms (*Yama-mai* and *Pernyi*) and also with *Cynthia* (Ailanthus silkworm).

The results of these trials were recorded in various papers, and my own reports on the rearing of about twenty species of wild silkworms were published annually, during a succession of years, in the 'Bulletin de la Société d'Acclimatation de France,' Paris; the 'Journal of the Society of Arts,' London; and other publications.

As I stated in an article in the 'Entomologist' (xxiii. 119), four species of wild silkworms with "closed" cocoons can be reared in the open air in Europe, even in northern parts; they all produce excellent silk, which can be reeled like that of *Bombyx mori*, and they are the following:—*Antheræa pernyi* (North China oak silkworm); *A. yama-mai* (Japanese oak silkworm); *A. roylei* (Himalayan oak silkworm); and *Telea polyphemus* (a polyphagous North American silkworm). To these four may be added two other species with "open" cocoons: *Attacus cynthia*, and *Platysamia cecropia* (a polyphagous North American silkworm). But the two species best adapted for rearing in the open air in England and other northern countries are *Antheræa pernyi* and *Attacus cynthia*. Referring to the diseases which attack the mulberry silkworm, I will quote a passage from one of my reports, the one for the year 1883, in the 'Journal of the Society of Arts':—"Worms reared in a state of captivity in warm rooms or 'magnaneries,' as the mulberry silkworm is, are all liable to the terrible contagious diseases which, for years, have attacked the latter to such an extent as to make the supply of mulberry silk considerably smaller than it used to be. In

France, more than fifty years ago, a most terrible disease (which has now, it is said, disappeared) was the 'Muscardine' (a white vegetable parasite which was developed inside the worm or in the chrysalis or pupa. Whilst the Muscardine preyed on the mulberry silkworms, the other epidemics had disappeared; but, from 1845, two other distinct diseases made their appearance one after the other. The first was the 'Pébrine' (pepper disease), a very ancient affection of the worms, which when attacked by it are covered with black spots, and grow smaller and smaller till they die. Later on, a second, very distinct from the first and a worse disease, made terrible ravages among the worms; this is the 'Flacherie.' The Flacherie is worse than the Pébrine, because, after all the expense and the labour of rearing the worms, which eat and grow well, showing apparently no signs whatever of disease, they die within a few days of the spinning period: hence a great disappointment. These diseases may co-exist, but when they are intense it often happens that one excludes the other, according to the ordinary law of epidemics. These diseases, created by the overcrowding of worms in hot rooms, may also be the consequence of rearing from eggs containing the germ of disease; for it must be remarked that a certain number of diseased worms live and procreate in spite of that germ of disease in them. On the contrary, silkworms reared in the open air, on trees, and in suitable climates, are in such conditions of 'hygiene' as to be almost entirely protected from contagious diseases."

The rearing of the best wild silkworms, on a large scale, for manufacturing purposes, should be encouraged in their native countries; for although the species previously mentioned, and some others, might be acclimatized and even naturalized in Europe, yet, they could not, as a rule, be bred in such quantities as in their native countries. Besides, as these wild silkworms, like other Lepidoptera, are reared in Europe by entomologists in order to study the larvæ and obtain fresh specimens of the perfect insects for collections, it will also be a profitable occupation, to entomologists and other persons residing abroad, to rear larvæ of various species for the purpose of sending the pupæ to Europe, as they will always be readily purchased.

With respect to the rearing of the larvæ or caterpillars in their native countries, the best plan is of course to rear them on the trees or their other food-plants, taking care to protect them against the attacks of birds or other enemies. Muslin bags or sleeves may be used to cover the larvæ; but when silkworms are reared on a large scale they have to be watched day and night till they have formed their cocoons, as is done with the *yama-mai* in Japan.

If recourse must be had to cut branches to rear the larvæ, the branches should be large instead of small, the stalks being of

course plunged in heavy bottles or jars filled with water. The branches should also be cut in the evening, or at least not when the sun is shining on them, whenever it is possible to do so, because branches or plants cut in the evening will keep longer in good condition; and the foliage on a big branch, being fed partly on the sap, will be more wholesome to the worms than if the branch were cut into a number of small twigs, the foliage on the twigs being too watery. The water in the bottles should also be kept quite pure, the necks of the bottles being stopped so as to prevent any of the droppings of the larvæ or dirt to fall into the water, which would poison the water and then the larvæ. Cut branches should also be kept in the shade.

When breeding-cages are used, they should always be of a large size, and the watering of the foliage (which is sometimes done in hot weather when rearing native larvæ) should be avoided as much as possible. As there is but little evaporation of the water in a breeding-cage, excess of moisture produces a kind of white fungus on the floor of the cage, which is injurious and often fatal to the larvæ. When rearing larvæ that are unknown and may have to burrow into the ground to turn into the pupa state, a few inches of light soil covered with a layer of moss should be put on the floor of the cage. But a few weeks' practice and experience will teach all that is required to be known for the proper rearing of larvæ, according to the circumstances in which one may be placed. Live cocoons and pupæ intended for exportation to Europe should be sent as soon as possible after their formation.

In the list of wild silkworms, it must be remarked that the species of the genus *Antheræa* have "closed" and perfect cocoons, and they are rich in silk. The cocoons of the genus *Actias* also are closed, but most of them are irregular in shape, and they are not so rich in silk as those of the genus *Antheræa*. The cocoons of the genus *Attacus* are "open" at one end, and many of them are rich in silk.

Trusting these few remarks may be of some use, I now give a list of wild silkworms, as far as they are known to me up to the present time.

(To be continued.)

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. DE VISMES KANE, M.A., M.R.I.A., F.E.S.

(Continued from p. 124.)

[*HADENA GENISTÆ*, *Bork.*—Birchall's notice of the occurrence of this species from Wicklow proves to have been based on erroneous information, and this he confirmed by a letter to me.

Mrs. Battersby, of Cromlyn, Co. Westmeath, has a specimen she believes to have been taken there. There is also another rather unsatisfactory record elsewhere, but I think it best to await more satisfactory evidence before admitting the species as Irish.]

HADENA RECTILINEA, *Esp.*—Killarney, not uncommon (*B.*), and Torc Wood (*W. Salvage*); several specimens near Galway, and one at Clonbrock (*R. E. D.*), which are identical with those from Aberdeen, var. *semivirgata*, Tutt.

XYLOCAMPA AREOLA, *Esp.*—Widely distributed, but rarely numerous. "Common on the Wicklow coast" (*B.*). Some specimens are prettily tinted with rose on the pale markings, and some very dark forms (var. *suffusa*, Tutt) occur. A strikingly pale aberration, freshly emerged, was taken by me at Arklow, having no trace of black dashes or lines. The pale blotches and antemarginal band are of dirty white, showing upon a uniform pale brownish yellow ground. Localities:—Howth (*G. V. H.*), and Phoenix Park (*Halbert*), Co. Dublin; Powerscourt, Greystones, Arklow, Ashford (abundant), Wooden Bridge (*M. F.*), Co. Wicklow; Sligo (*R.*); Clonbrock, three, and Galway, two (*R. E. D.*); Castle Blaney, Drumreask (abundant), Co. Monaghan; Favour Royal, Co. Tyrone; Belfast, scarce (*Bw. and W.*); Derry (*W. E. H.*), &c.

CALOCAMPA VETUSTA, *Hb.*—Universally distributed, and generally common in Ireland, and often extremely numerous on ivy-bloom. It varies scarcely at all. The ground colour of hibernated specimens is pale, but autumnal examples are mostly characterised by the ochreous brown of var. *brunnea*, Tutt. The sepia-brown of the inner marginal half of the fore wing is often very intense, as noticed by Guenée of a Scottish specimen (var. *suffusa*, Tutt), but sometimes of light tint, excepting a streak under the orbicular stigma. In these light examples the area between the reniform stigma and anal angle is but slightly darker than the ground colour. Mr. Tutt notes (*Brit. Noct. iii.* p. 108) that the ashy grey central shade along the median nervure and spreading over the central area of the wing of English examples is almost entirely absent in Irish ones.

CALOCAMPA EXOLETA, *L.*—This species contrasts curiously with the preceding in its comparative scarcity in Ireland, inversely to the proportion prevailing, I understand, in England. It occurs here and there all over the country, from north to south, and most of the localities given have produced only single or very few specimens. Among the comparatively small numbers which I have come across or examined there is but little variation; the brown shade on the lower half of the fore wing, however, is sometimes but lightly represented. Localities:—Howth (*G. V. H.*); Greystones, Tinahely (*Bw.*), and Arklow, Co. Wick-

low; Castle Bellingham (*Thornhill*); Belfast, commoner than *C. vetusta* (*W.*); Ballycastle, and near Derry (*W. E. H.*); Favour Royal, Co. Tyrone; Drumreask, Co. Monaghan; Enniskillen (*Col. Partridge*); Sligo (*R.*); Crossmolina, Co. Mayo, common (*S. R. F.*); Clonbrock, Co. Galway (*R. E. D.*); Killarney and Kenmare; Glandore, Co. Cork (*D.*); Cappagh, Co. Waterford.

CALOCAMPA SOLIDAGINIS, *Hb.*—One specimen near Galway in September, 1893 (*R. E. D.*).

XYLINA ORNITHOPUS, *Rott.*—Generally scarce, but in a few places numerous, as at Ashford, Co. Wicklow. It varies somewhat in ground colour and strength of design. The lightest specimens are whitish, clouded with faint grey shadings, giving a mealy appearance, even the costal black dashes becoming but slightly marked. The basal streak is, however, always distinct and black. The commonest form is of a pale grey, with numerous darker shadings and fine black dashes and lines. The darkest are of a grey ground, with an irregular black central band from costa to inner margin passing between the stigmata, and a waved antemarginal black line. Otherwise as the normal form, with darker shadings, and more pronounced black dashes and markings. Some examples of this form have the lower area of the reniform brownish yellow instead of the pale ferruginous of ordinary fresh specimens. Where abundant, it can be found by searching the trunks of trees in the daytime, and especially those of birch, to the bark of which its colours assimilate admirably. Localities:—Rathfarnham (*Rev. J. G.*), Howth (*G. V. H.*), Carrickmines, Kill of the Grange, Co. Dublin; Powerscourt, Arklow, and Ashford, Co. Wicklow; Cappagh, Co. Waterford; Killarney, not scarce; Glandore, Co. Cork, not scarce; Markree Castle and L. Gill, Sligo; Killynon, Co. Westmeath; Farnham, Cavan; Tempo (*Langham*); Castle Bellingham (*Thornhill*).

XYLINA SEMIBRUNNEA, *Haw.*—The only Irish specimens I have seen are two from near Galway, and one from Clonbrock, which were taken by the Hon. R. E. Dillon. Mr. W. Salvage informs me that when collecting at Rossbeigh, Co. Kerry, at sallow, he met with numerous specimens.

XYLINA SOCIA, *Rott.*—“Widely distributed and frequently abundant. I once saw an ivy-bush near Tullamore swarming with this insect” (*B.*). I can endorse this statement; there are few Irish localities where *X. socia* is not to be found. Hibernated specimens are met with on sallow, and the ova so obtained feed up readily on lime. The form most common is that of var. *pallida*, Tutt, of pale ochreous grey, without any very definite markings. More rarely var. *umbrosa*, Esp., is met with, having

a dark shading under the stigmata (occasionally suffused to the base), and sometimes a lighter one above. These rarely coalesce, and form an indeterminate median band not reaching the inner margin; and occasionally distinct linear markings are scattered over the wing-area. In no instances have I seen very red forms, but at Clonbrock, Markree Castle, Sligo, and Waterford reddish suffused specimens have been met with. Localities:—Generally fairly abundant in Co. Dublin, as at Carrickmines, Howth, &c.; and similarly in Wicklow, where, as at Ashford and about Arklow, it is numerous. Not rare at Castle Bellingham, Co. Louth (*Thornhill*); Farnham, Cavan; and in Co. Monaghan and Tyrone; Cromlyn (*Mrs. B.*), and Killynon (*Miss R.*), Co. Westmeath; Hazlewood, &c., near Sligo; Crossmolina, Co. Mayo; Clonbrock, Co. Galway, abundant (*R. E. D.*); Rossbeigh (*W. Salvage*) and Killarney; Glandore, Co. Cork; and Cappagh, Co. Waterford.

ASTEROSCOPIUS SPHINX, *Hufn.*—Birchall records it as Irish on the authority of Dr. Ball, but no locality was given. A female was taken by me at Clonlost, Co. Westmeath, on Nov. 4th, 1882. But at Clonbrock, Co. Galway, it occurs rather plentifully, the males coming to light (*R. E. D.*).

CUCULLIA VERBASCI, *L.*—Dublin and Wicklow, common (*B.*); Howth (*G. V. H.*) I have never met with the insect.

CUCULLIA LYCHNITIS, *Rbr.*—Some specimens have been taken by the Hon. R. Dillon at Clonbrock, who has listed them as *C. verbasci* in error. The large wood in the demesne is carpeted very extensively with *Lychnis diurna*.

CUCULLIA ABSINTHII, *L.*—In his 'Supplementary Catalogue' Birchall mentions the capture of one specimen in 1873, at Cromlyn, Co. Westmeath, by Mrs. Battersby.

CUCULLIA CHAMOMILLÆ, *Schiff.*—Dublin and Wicklow, common (*B.*). I can confirm this record. The larvæ are plentiful all along the Dublin and Wicklow coast from Rush to Lambay I., Howth, Kingstown, to Greystones, &c. Kilcornan, Co. Galway (*B.*); Sligo, one (*R.*). The imagines I have bred are extremely dark, some specimens having the area between the elbowed line to the pale basal streaks of a uniform brownish black. In most, however, the ground colour is blackish grey, with black nervures alternating with grey streaks (var. *chrysanthemi*, *Hb.*). I do not know that the blackish form has been described.

(To be continued.)

NOTES AND OBSERVATIONS.

SMALL EXAMPLE OF PHIGALIA PEDARIA.—I have a specimen of *P. pedaria* measuring only fifteen-sixteenths of an inch in expanse. Is not this exceptionally small for the species? The specimen was taken on a tree-trunk at Walthamstow on Jan. 21st, 1894.—E. CORNELL; 14, Wellesley Road, Leytonstone, E., April 15, 1896.

SEsia CONOPIFORMIS IN BRITAIN.—We have been informed by Mr. Dale that the *Sesia* he recorded as this species (Entom. xvii. 245) was wrongly determined, and that so far he has not been able to reconcile the specimen with any known species of the genus.—ED.

WAS CLOSTERA ANACHORETA INTRODUCED?—In Mr. Meyrick's new work I observe that, under the above-named species, the author says:—"Perhaps introduced, but temporarily naturalised in Kent and Norfolk." Will Mr. Meyrick kindly explain how he harmonises this statement with the fact that the original specimens, captured in the larval state at Saltwood, and bred by Mr. Sidney Cooper in 1858, remained in that gentleman's collection as *C. curtula* until after his visit to Mr. Doubleday in 1860? If Mr. Cooper did not introduce them, has Mr. Meyrick any idea as to who did introduce them, and for what purpose? And does Mr. Meyrick suppose that if Mr. Cooper's captures had been determined and reported in, say 1858 or 1859, their authenticity would have been called in question?—H. G. KNAGGS; 189, Camden Road, April, 1896.

HYBERNATION OF THE LARVÆ OF COLIAS HYALE.—I have read with interest Mr. Williams's note (Entom. xxix. p. 128) respecting the hybernation of the larvæ of *Colias hyale*, as it so closely coincides with my remarks upon the larvæ of this species (Entom. xxv. p. 271; xxvi. p. 145) when I pointed out that the larvæ were capable of passing the winter in *complete* hybernation. The decisive manner in which my larvæ entered into hybernation, resting upon a layer of silk spun for the purpose, remaining in a hybernated condition for three months, and living for 121 days after entering into that state, is sufficient proof that this species is capable of hybernating in the larval state, which I fully believe to be its usual habit.—F. W. FROHAWK; April, 1896.

SUGAR v. HONEYDEW.—Prof. Clowes and Dr. Sudborough, of University College, Nottingham, have kindly promised to make a quantitative analysis of honeydew, if it can be procured in sufficient quantity, with the view of discovering whether some substance more attractive to moths than sugar or treacle can be produced artificially. Entomologists interested in the matter are asked therefore to collect leaves covered with honeydew and send them, before the middle of July, as freshly gathered as possible, to Prof. Clowes, University College, Nottingham. As large a quantity as possible should be sent, so as to give enough for an investigation.—F. C. WOODFORDE.

NOTES ON VARIOUS INSECTS.—*Encyrtus elpis*, Walk. This has been bred from *Lichtensia viburni*, the ivy Coccid, by my friend Mr. Richardson.—*Eupacilia alismiana*, Rag. This species used to stand in our lists as

E. udana, Gn.; but this name has lately been transferred to *E. notulana*, Zell. Why should not the old name *griseana*, Haw., be restored to the species renamed by M. Ragonot *alissima*?—*Catoptria asseclana*, Steph. This is clearly the northern form of *C. ulicetana*, Haw.—*Periplaneta australasiae* and *P. americana*, &c. There appears to be a mistaken idea in the minds of some entomologists that these are recent additions to the British fauna. This is not so, for I have specimens of the former taken in a grocer's shop at Sherborne as long ago as 1839, but which have stood in my collection as representatives of the latter. *P. americana* and also *P. madeira* were recorded by Stephens in his 'Illustrations' as being frequently taken in London previous to 1835; and also *Blaberus giganteus* as occurring in the West India Docks. A smaller species, *Blatta germanicus*, he has also recorded as being an introduced species occurring in London and other towns.—*Chironomus nubilus*, M. This pretty species may be added to the British list, as I have taken it here; and Mr. Austen, on the banks of the Thames.—*Chironomus flexilis*, L. This pretty gnat I have taken on the banks of the Stour near Christchurch.—*Thrips vulgatissimus*, L. Has been very common this spring in the flowers of the daffodil. This belongs to the order Thysanoptera, of which there is an excellent monograph by Haliday in the third volume of the 'Entomological Magazine,' published in 1836.—C. W. DALE; Glanvilles Wootton, April 6th, 1896.

MR. C. E. FRY'S COLLECTION.—This collection was sold on March 9th and 10th, and realised a total of £405 9s. 6d. It was richer in rarities than in varieties, but the former were in some cases considered of such doubtful origin as to cast a suspicion over genuine British examples; the condition was fair. Four specimens of *Pieris daphidice*, only fetched an average of 10/- each. Three of *Argynnis latona*, 5/- each. A nice lot of *Argynnidæ*, including a var. of *A. paphia* and a dark Scottish *A. aglaia*, went for 21/-. Five *Vanessa antiopa*, from various localities, made an average of 10/6 each. The series of *Chrysophanus dispar* were fine: eight males realised an average of £4 10s. each; six females produced £30 5s., the lowest price being £2 10s., and the highest £6 15s., the latter being a bred specimen, and one of the finest I have ever seen anywhere. Three pairs of *Lycæna acis* made from 18/- to 20/-; and two males, 14/-. The hawk-moths went cheap, and, judging from prices, their authenticity was held not altogether proven. *Deilephila euphorbiae*, from Wilkinson and Curzon's collections, averaged 5/6; and *D. lineata*, 7/3 each. *Cherocampa celerio*, 7/6 each. Three specimens of *Sesia allanti-formis*, all said to be taken by Mr. Wilkinson near Bristol, 52/6, 52/6, and 27/6 each; and Mr. Hammond's Ashford specimen of *Sesia asili-formis*, 40/-. Six *Deiopeia pulchella* averaged 12/- each; whilst pairs of *Lalia canosa* sold at the rate of 21/6 a pair. Specimens of *Lasio-campa ilicifolia*, taken by Butler, Bristol, made from 16/- to 32/6 each. The original specimen of *Nyssia lapponaria*, which on March 20th, 1884, was sold at Stevens' for the large sum of £14, now only fetched 45/-. Two pairs of *Cleora viduaria* and a triplet made 30/-, 27/6, and 22/-; and a single *Boletobia fuliginaria*, taken at Victoria Docks by Mr. Herring, 25/-. Two specimens each of *Acidalia circellata* and

A. perochraria went for 32/6. The collection contained nine British (?) *Lythria purpuraria*, all taken by Button, Gravesend; no one believed in these, and they only realised 8/- the lot. A specimen of *Aplasta ononaria*, taken by Bailey, Folkestone, made 20/-. A series of *Abraxas grossulariata*, including two examples of var. *varleyata*, made 35/-. A nice black var. of *Larentia didymata* sent the lot it contained up to 26/-. Three lots of *Eupithecia*, each containing a couple of a supposed new species, with pairs of *E. jasioneata*, and other good pugs, made 20/-, 12/-, and 8/- a lot. Thirteen *Phibalapteryx polygrammata* and fourteen *Cidaria reticulata* averaged a little under 6/- a specimen. The Standish collection of Tortrices was also disposed of, but, with the exception of a pair of *Peronea cristana* var. *curtisana* which made 42/-, prices were poor all through. *Drepana sicula* were sold at about 10/- each. Three specimens of *Synia musculosa* fetched 14/-, 21/-, and 18/-; and five of *Leucania vitellina*, 13/-, 14/-, 20/-, 14/-, and 8/- each. *Nonagria sparganii*, from Mr. S. Webb, sold at an average of 25/6 per pair. Ten specimens of *Crymodes exulis*, sold in pairs, made from 18/- to 26/-. A specimen of *Hadena peregrina*, taken at Lewes by Miss Meek, ex Curzon's collection, 12/-. The collection contained seven *Hydrilla palustris*, all said to have been taken by Mr. A. Houghton; the lot realised only 51/-. *Dianthæcia barrettii*, in fine condition, sold at from 21/- to 35/- a pair; and a fine variety of *Polia nigrocincta* at 40/-. A specimen of *Hadena satura*, Newmarket Heath, was bought at 12/-. Two specimens of *Xylina zinckenii*, taken at Rannorth by W. Clare, produced 12/- each. A pair of *Plusia moneta*, with others, made 30/-; and a single specimen, 24/-. An example of *P. ni* realised 21/-. Two specimens of *Catocala fraxini*, 30/- and 21/-. Mr. Vine's first British specimen of *Catocala electa* produced 55/-; and two magnificent varieties of *Ophiodes lunaris*, 63/- and 40/-. Pairs of *Noctua subrosea* made 12/-, 10/-, 16/-, 28/-; and a fine bred pair, six guineas. A fine series of *Cidaria russata*, from Arran, containing one beautiful yellow form, made 65/-. The three cabinets realised as follows: 52 drawers, £14 3s. 6d.; a 12-drawer Standish, £7 15s.; and a 20-drawer ditto, £13 13s.—THOS. WM. HALL; Stanhope, The Crescent, Croydon.

CAPTURES AND FIELD REPORTS.

EARLY APPEARANCE OF *LYCÆNA ARGOLUS*, *PARARGE EGERIA*, AND *SMERINTHUS OCELLATUS*.—Mr. G. C. Green, South Devon, reports in the 'Field':—"I have seen this morning, March 30th, in my garden, and watched for a long time, a lovely newly-emerged specimen of the azure-blue butterfly (*L. argiolus*). I have also seen this morning many fresh specimens of the speckled wood (*H. ægeria*)." I have to-day received, for identification, from Stratford-on-Avon, a living male specimen of *S. ocellatus*, the letter bearing date April 16th.—F. W. FROHAWK.

LEPIDOPTERA IN NORWAY.—Can any of your readers tell me whether there are any Lepidoptera to be taken in the neighbourhood of Loen, Nordfjord, Norway, in August?—J. M. HICK; Trimdon Vicarage, Trimdon Grange, R.S.O., April 13th.

CAPTURES AT SALLOWS, 1896.—I have been working the shallows this season with more or less success. I was fortunate in finding *Oporina croceago* in perfect condition, and succeeded in taking eighteen specimens. The *Tæniocampas* were also fairly well represented; *T. cruda* was by far the most abundant, and I found one very light specimen with nearly black discoidal spots. *T. stabilis* was also abundant, and this as well as *T. instabilis* afforded some striking varieties. *T. munda* was by no means plentiful; I only came across some fourteen specimens, in one of which the "twin-spots" were of a light red colour. *T. gracilis* did not appear till about March 27th, but after that was very abundant, and I secured some beautiful specimens, a few being nearly $1\frac{3}{4}$ in. in expanse. *T. gothica*, of course, swarmed, but neither *T. miniosa* or *T. populeti* turned up, at which, however, I was not surprised, as I have never met with either in this neighbourhood. Perhaps the scarcest was *T. rubricosa*; I only took eight specimens, one of which was of a deep reddish brown, and having the discoidal spots very clearly defined and of a light yellow colour, presenting a striking contrast to the rich ground-colour. I also met with *Scopelosoma satellitia*, *Cerastis vaccinii*, *Anticlea badiata*, *Selenia illunaria*, *Xylocampa lithoriza*, *Hybernina progemmaria*, and one *Eupithecia exigua*.—H. W. SHEPHEARD-WALWYN.

UNUSUAL PAIRING OF LEPIDOPTERA.—On the night of March 24th I found on a shallow twig a male of *Tæniocampa stabilis* in cop. with a female *T. gothica*. I took them carefully home and fed them with shallow blossom. They remained in cop. for nearly a fortnight, at the end of which time the female seemed very feeble, and died after depositing three ova. Mr. F. G. Briggs, writing from Devonshire, tells me that he has just found a male *Hybernina progemmaria* in cop. with a female *T. cruda*.—H. W. SHEPHEARD-WALWYN; Bidborough, Tunbridge Wells.

PLUSIA MONETA IN SURREY, 1895.—In August of last year I had the good fortune to capture a splendid specimen of *Plusia moneta* in a garden here. This moth was flying just after dusk round a tree loaded with ripe plums, which possibly had attracted it. Can you tell me any particulars as to the life-history or previous occurrence of this moth in England?—J. B. MORRIS; Malden House, Malden Road, Wallington, Surrey, March 23rd.

[*P. moneta* was first recorded as British in 1890, and it has been captured or bred each year since. The larva feeds on monkshood. *Vide* Entom. vols. xxiii—xxvii.—ED.]

ENDROMIS VERSICOLOR AT READING.—On April 6th, after several hours' close searching in this district, I had the pleasure of taking a very fine female of the above insect; I also found two small batches of ova.—W. E. BUTLER; Hayling House, Reading, April 10th, 1896.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—April 1st, 1896.—Professor Raphael Meldola, F.R.S., President, in the chair. Donations to the library were announced, and thanks voted to the respective donors. Mr. Luke Bishop, F.R.G.S., of 3, Tokenhouse Buildings, E.C., and Mr. Robert Nesham, of Utrecht House, Clapham Park, S.W., were elected Fellows of the Society. Mr. Champion exhibited, on behalf of Mr. Blatch, specimens of *Quedius riparius*, Kellner, captured in

February last on the banks of running streams at Porlock, Somerset. The insect was an interesting and unexpected addition to the British list, and the second recent novelty from the west country, the other being *Ochthebius lejolisi*, Muls. and Rey, found at Ilfracombe in June last by Mr. Bennett. It would seem to indicate that further additions to our list of Coleoptera might be expected from the country south of the Bristol Channel. He added that Mr. Waterhouse had informed him that he had seen specimens of the *Quedius* from Wales and Scotland. Mr. Champion also exhibited a small collection of Coleoptera made by Mr. O. V. Aplin in Southern Tunis during various expeditions inland from Gabes. The collection included some interesting Tenebrionidæ of the genera *Pimelia* and *Adesmia*. Mr. Aplin noticed specimens of these insects impaled by shrikes. Dr. Sharp, Mr. R. Trimen, and Mr. McLachlan made some remarks on the subject of the impalement of insects by birds. Mr. Goss exhibited, for Mr. Cameron, an apterous male of *Mutilla contracta* taken by Mr. Rothney in Barrackpore, India. The specimen was stated to be the first recorded instance in this species of a wingless male, and was also abnormal in having the thorax incised laterally. Dr. Sharp called attention to the fact that at a recent meeting of the Society (March 20th, 1895, see Proc., 1895, p. x) a specimen of a supposed dimorphic form of one of the species of *Dytiscus* was examined, and Prof. Stewart enquired whether any anatomical examination had been made of the sexual organs. He said that in the 'Comptes Rendus Soc. Bordeaux,' 1894, there was an account of the examination of the sexual organs of the supposed second form of *D. marginalis* by Mons. Peytoureau, who came to the conclusion that it was really a distinct species, which he called *D. herberti*. Prof. Poulton exhibited examples of the type labels now in use in the Hope Collection at Oxford, and illustrated their employment by projecting on the screen, by the lantern, a photograph of the Westwood types of African *Eusemia* described in Oates's 'Matabele Land' (Lond., 1881). He said that such labels, having been once set up in type, could be reproduced in electrotypes very cheaply and efficiently. Black ink was considered better than red on account of its greater permanence. Mr. Verrall was of opinion that no species should be described from a single specimen or type, but from many specimens, and he wished every so-called "type" could be destroyed as soon as a species had been described from it. He knew of cases in which a "species" had been described from a single female specimen in bad condition. Mr. Blandford explained the system of labelling types in the Brussels Museum. Dr. Sharp, Prof. Meldola, Mr. McLachlan, and Prof. Poulton continued the discussion. Mr. Blandford exhibited a series of lantern slides showing the uses to which photography could be put in entomological illustration. The photographs shown included various Saturniidæ, Vanessidæ, species of *Mamestra*, *Tipula*, *Ophion*, *Carabus*, *Lucanus*, *Sitones*, &c., as well as one or two examples of insect-injury, and a view in Windsor Park showing oaks defoliated by *Tortrix viridana*. Mr. Blandford said that the photographs were taken without any considerable practice in photography; that good and well-set specimens were desirable for reproduction; the colour-values had to be arrived at by the careful use of orthochromatic methods, and a large lens of good focal length

should be used. Careful attention had to be paid to the lighting of the objects, a point in which entomological experience was of great value. Prof. Poulton read a paper "On the Courtship of certain European Acridiidae," from observations made in exceedingly favourable weather at the end of August and beginning of September, 1895. He was much indebted to Mr. F. Jenkinson, of Cambridge, and Mr. F. V. Dickens, for many independent observations and valuable confirmation. The observations were almost all made in the neighbourhood of the Weissborn Hotel, high above Vissoye, in the Val d'Anniviers. Dr. Sharp had been kind enough to name the species referred to in the paper. Mr. G. F. Hampson read a paper entitled "On the Classification of Three Subfamilies of Moths of the Family Pyralidae: the *Epipaschiinae*, *Endotrichinae*, and *Pyrulinae*."—H. Goss, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*March 26th.*—R. South, Esq., F.E.S., President, in the chair. Mr. A. E. Eldridge, 50, Alpha Road, Surbiton, and Mr. F. A. Bowen, 11, Buckland Crescent, Hampstead, were elected members. Mr. F. Enoch gave a most interesting and instructive lecture, with lantern illustrations, entitled "The Life-history of the Tiger Beetle (*Cicindela campestris*)," being an epitome of his very numerous observations on this insect, both in nature and in confinement, during the last five years. Mr. Clark exhibited a number of photo-micrographic slides, many of which were prepared from specimens lent by members of the Society, and a fine specimen of the Röntgen ray photography. Many visitors were present.

April 9th.—The President in the chair. Mr. R. Adkin exhibited two specimens each of *Margarodes unionalis* and *Mecyna polygonalis*, which were taken at Deal in 1877 by the late Mr. Tugwell, and contributed notes on the occurrence of these and other species of Pyralides. Mr. Barrett, on behalf of Mr. Capper, of Liverpool, some 400 drawings, coloured by hand, of the remarkable varieties existing in his collection. Mr. Tunaley, a lantern for entomological purposes, invented by himself, to obviate the inconvenience and smell of oil. It was thought that it would be, when completed, a capital success. Mr. South, a banded specimen of *Vanessa urticae* taken alive in his house at Tooting on March 22nd. Mr. Williams, a living specimen of *Bombylius media*. Mr. Turner, an apparatus sent to him for exhibition for taking moths from a lamp. It could be put on the end of a stick and worked by means of a string. Mr. McArthur, a bred series of *Hypsipetes trifasciata* from Hoy. They were of a rich chestnut colour, and had been reared from larvæ fed on heath; this was considered to be a most unusual food. Mr. Edward exhibited a number of examples of mimicry in Exotic Rhopalocera.—Hy. J. TURNER, *Hon. Report Sec.*

OBITUARY.—With the deepest regret we have to announce the death of Mr. J. A. COOPER, of Leytonstone. The only particulars we have up to the time of going to press is that he died on April 18th from pneumonia supervening on influenza.

EXCHANGE.

[The publication of Notices of Exchange, or of Advertisements, in the 'Entomologist' is in no way a guarantee for the British nationality, authenticity, or good condition of the Species. This Notice is not given to throw doubt on the bona fides of Exchangers or Advertisers, but to absolve the Editor from responsibility, in case the liberty allowed should be abused.] *Marked * are bred; † are high flat-set.*

Duplicates.—Lapponaria.* *Desiderata.*—Luteago var. Barretti* only.—W. M. Christy; Watergate, Emsworth, Hants.

Duplicates.—Ova of Opima. *Desiderata.*—Numerous; especially Scotch and southern forms.—T. G. Mason; 8, Lansdowne Road, Higher Crumpsall, Manchester.

Duplicates.—Ova of Erosaria, Vespertaria, and Populeti; imagines of Erosaria,* Populeti,* Vespertaria,* Suspecta, Sparsata, Blomeri, &c. *Desiderata.*—Ova, larvæ, or pupæ, and numerous imagines.—R. Dutton; Fishergate, York.

Duplicates.—Haworthii, Bicolorata, Chi, Graminis, Nictitans (Irish), Galiata, Zonaria, Rubricosa; ova of Opima, Zonaria, Rubricosa; larvæ of Chi, Lichenaria. *Desiderata.*—Numerous (no list).—J. E. R. Allen; Portora, Enniskillen, Ireland.

Duplicates.—Japanese Lepidoptera in papers; also ova of Yama-Mai; larvæ of Pernyi and Vinula. *Desiderata.*—Ova, larvæ, or cocoons of Exotic Bombyces; Exotic Lepidoptera in papers.—T. J. W. Finch; Belgrave Road, Mutley, Plymouth.

Duplicates.—Piniperda, Rubricosa, Instabilis var. Gracilis (fine), Munda, Suspecta, Lunosa. *Desiderata.*—Hippocastanaria, Filigrammaria, Ruficinctata, Tenuiata, Palumbaria, Petrificata.—D. Chittenden; Willesborough Lees, Ashford, Kent.

Desiderata.—Exotic, European, and British Lepidoptera for ditto.—Rev. M. Hick; Trimdon Vicarage, Trimdon Grange, R.S.O.

Desiderata.—Hesperidæ of the world, in exchange for North American Lepidoptera.—W. F. Fiske; Mast Yard, N.H., U.S.A.

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CHANGE OF ADDRESS.—F. Nelson Pierce, from 7, The Elms, to 1, The Elms, Dingle, Liverpool.

MEETINGS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—Wednesday, May 6th, at 8 p.m. Papers to be read:—(1) "Notes on Seasonal Dimorphism in South African Rhopalocera," by Guy A. K. Marshall, F.E.S. (2) "Notes on Indian Mutillidæ," by Peter Cameron, F.E.S. (3) A Discussion will take place as to the best means of preventing the extinction of certain British butterflies.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.—Meetings on the 2nd and 4th Thursdays in each month, at 8 p.m.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—The meetings of this Society (held at the London Institution, Finsbury Circus, E.C.) will take place on the 1st and 3rd Tuesdays in each month, from 7.30 to 10 p.m. as heretofore.

NORTH LONDON NATURAL HISTORY SOCIETY.—Meetings are held on the 2nd and 4th Thursdays in each month at the North East London Institute, Dalston Lane (close to Hackney Downs Station on the G.E.R.), from 7.45 to 9.30 or 10 p.m.

TO CONTRIBUTORS.—Papers, Notes, and Communications, on all branches of Entomology, are solicited. Contributors are requested to conform, as far as possible, to the following rules:—All Communications must be *clearly* written on one side only of the paper. Generic names must be given in full, excepting where immediately before used. The Editor is not responsible for unused MS., neither can he undertake to return it, unless especially asked to do so. Contributors of the more important articles receive six copies of such articles. NOTICES of EXCHANGE (inserted without charge) must contain nothing more than the specific names of the duplicates and desiderata, except when two insects are known by the same specific name, and must be *clearly* written on one side only of the paper. All notes, papers, books for review, &c., and notices of exchange should be sent to the Editor,

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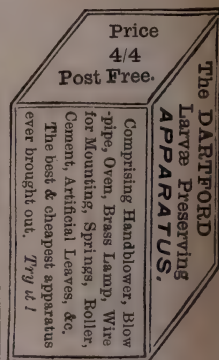
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PANCHLORA MADEIRÆ, FAB.



THIS handsome species, though not indigenous, has long been recorded as occurring in England. Of the two examples figured above, the one with expanded wings (fig. 1) was taken in Covent Garden Market on Nov. 8th, 1895, and exhibited alive

at the South London Entomological Society on Nov. 14th, 1895, and during the meeting deposited an immature egg-capsule. The other, also from Covent Garden, was taken in 1894. Both are in my collection.

No doubt both were imported in cases of bananas.

The reproductions are natural size.

C. A. BRIGGS.

FUNGI PARASITIC ON BUTTERFLIES.*

By J. C. RICKARD.

IN the course of an examination of the wing-scales of *Pieris brassicæ*, I was surprised to notice the occurrence of large numbers of microscopic fungi among them; as this kind of parasitism was new to me, I looked through some thirty or forty volumes to see if I could find anything recorded about them, and being unable to find the slightest reference, I thought a few remarks concerning these organisms would be interesting to entomologists.

The scales of the upper surface of the wings of the male *Pieris brassicæ* are long and narrow, and have either a single notch or from two to four pectinations at the free extremity; the fungi bear a considerable resemblance to these in form and colour, and occur in such large numbers that in some instances they outnumber the scales as seen in the field of the microscope. The scales of the female butterfly do not resemble those of the male, as they are much shorter and broader in proportion. This sex, in this and the other species I have examined, is apparently free from the parasites, as also are the under sides of the wings in both sexes.

I am afraid I cannot describe these fungi in technical terms; but the diagram shows a rhizoid supporting the body or peridium, at the free end of which are two rounded lobes separated from each other and forming a kind of notch, from the middle of which rises a fine stalk bearing a mass of spores enclosed in a sort of bag, thus forming a sporangium.

The absence of the parasite from the female butterflies cannot be accidental, and presents a curious physiological problem. Nine females of this species were examined without finding any of the fungi; on the other hand, I examined nineteen males and found every one of them to be infected.

A somewhat similar fungus is found on the males of *Pieris rapæ*, but in reduced numbers; this is much shorter and broader than that of *P. brassicæ*, and appears to be wrinkled longitudinally, thus presenting an appearance almost like the

* Paper read before the Cambridge Entomological and Natural History Society, March 6th, 1896.

striated surface of the scales. Of this species I examined and found fungi on four males, but could not detect them on any of the seven females that came under my notice.

A fungus found on *Pieris napi* is apparently identical with that of *P. rapæ*. The butterfly from which my specimens were taken had been killed seven or eight years, and the fungi have probably become distorted in drying, and the sporangia have in most cases fallen from their stalks, and may be seen lying among the scales. I only examined one pair of this species; it was only the male on which fungi were found; and I may state here in reference to the other species that I am about to mention, that I have not yet discovered a fungus on any female individual.

A fungus of somewhat different form was found on a foreign specimen of *Pieris daphidice*; this is oblong in shape, the end bearing the rhizoid somewhat angular; there are no lobes as in the preceding examples.

Euchloë cardamines has a similar parasite, perhaps slightly narrower than that of *P. daphidice*. They occur in both the white and the orange portions of the wing.

The males of *Aporia cratægi* also have the same type of fungus parasitical upon them. They differ from the foregoing in that their sides are not parallel, thus causing them to taper somewhat towards the apex.

I have also examined three males and one female of *Leucophasis sinapis*, with the result that no fungi were found on any of them. This is the only species of British white butterfly on which the fungus is not present, and is also the only species in which the males possess more black scales than the females.

Several South African butterflies have similar parasites. Thus *Pieris severina* has one much like that of *E. cardamines*, except that the cyst is supported on a shorter stalk; while *Anthocharis achine* and *A. omphale* present modifications of form, and have their sporangia on rather long stalks, and also show signs of rupture at their apices. *Pieris agathina* (also a South African species) is the host of a very delicate and beautiful fungus. This is square in section, has no rhizoid like those previously mentioned, but is supported by four "ribs,"* one at each angle; the upper part of the body has a number of similar ribs,—all these ribs and the connecting membrane are reflexed or turned over at the top, which, while affording additional strength at the open end of the body, also forms a pretty border or coping to its walls; there is a central stem passing through the whole length of the fungus bearing a large sporangium, which, with the exception of a black spot at the apex, appears like a bubble of blown glass.†

* These are probably "paraphyses" having a tendency to bend outwards, thus assisting in rupturing the top of the sporocarp, and converting the original circular shape into the square form of the mature organism.

† "Dr. Wollaston found the spores of *Reticularia maxima* to yield a

As this specimen of *agathina* has been dead some five- or six- and-twenty years, this glass-like cyst is probably formed of something different to ordinary vegetable substances.

Various species of Satyridæ are the hosts of a different form of fungus. In these the spores are not enclosed in a sporangium, but remain in the perithecium until mature, when they escape through a projecting tube* or spout; considerable numbers of spores may be seen on some of the slides, having fallen out since the specimens were mounted. Fungi of this character I have found on *Satyrus semele*, *Pararge egeria*, *P. megæra*, *Epinephele janira*, *E. tithonus*, *E. hyperanthes*, and *Cænonympha pamphilus*; none were found on *C. davus* or *Melanargia galatea*; I have not examined *Erebia epiphron* or *E. medea*. The females of this family also seem to be free of the parasites. The fungus of *S. semele* has its sides parallel with each other, which, with its somewhat dark colour, gives it a robust appearance; the rhizoid forms a fringe the whole width of the base. The others are all much alike, and resemble in outline miniature carrots, or other similar tap-roots. They only differ in their relative proportions, and in being of lighter or darker colours. Thus the fungi of *E. janira* and *P. egeria* are long and slender, tapering gradually to the base; while that of *E. tithonus* is much broader above, and diminishes almost to a thread some distance from the rhizoid. The fungus of *E. hyperanthes*, as might be expected, is very dark, almost black (they only occur in small numbers); while little *C. pamphilus* has a correspondingly small fungus, which, however, is rather broad right down to the rhizoid, the latter being large in proportion to those found on the other species.

The parent forms of the fungi will probably be found—in a degraded state—on the food-plants of the various butterfly larvæ. We may easily believe that the spores would be distributed by the butterflies when hovering over the plants, and, after leading an epiphytal existence for a time, would be eaten by the caterpillars with the leaves on which they feed.

All the fungi hitherto noticed appear to belong to Berkeley's Gasteromycetes, a rather high order of the class. But certain species of *Lycæna* support a minute fungus, which, seen by transmitted light, appear like miniature tennis-rackets; viewed in this manner we get a false idea of their structure. They are conical or flattened pear-shaped bodies, with moderately long stems, no perithecium being present; the spores are external, and arranged in rows on the surface of a sporophore. The microscope I am using will not enable me to determine whether the spores are or are

phosphoric glass" (Berkeley, Crypt. Bot., page 339). Does the sporangium noticed above owe its transparency to this substance?

* These tubes are, I believe, the representatives of the "trichogyne" of some seaweeds (Floridææ, &c.). —J. C. R.

not contained in asci; but it is evident that this fungus belongs to an inferior group to those found on Pierids and Satyrids. I have found them on males of *Lycæna bellargus*, *L. corydon*, and *L. icarus*, all brightly-coloured species in comparison with *L. argiolus*, *L. minima*, and *L. astrarche*, from which they are apparently absent.

The relationship between parasite and host seems to be something more than ordinary parasitism. I have pointed out that, with the exception of *L. sinapis*, which has no parasite, the males of the British "whites" have fewer black scales than the females, the reverse being the case in regard to *L. sinapis*; so also with the "blues," the infested species are those that are considerably more brilliant than those not infested; the inference being that the fungus, by assimilating carbonaceous matters present in the excretory products of the butterfly that would otherwise be deposited in the wing-scales, tends to make the "whites" whiter, and the "blues" brighter than they would otherwise be. Fungi, unlike other plants, exhale carbonic acid, so a considerable amount of carbon must ultimately be eliminated from both the host and parasite. If this suggestion is correct, it is a case of symbiosis between butterfly and fungus; in any case, students of variations occurring in these groups will have to take into account that at least some part of the variation is due to the presence or absence of these parasites.

3, Halifax Road, Cambridge.

[We understand from Mr. Rickard that he has continued his investigations of these butterfly "fungi," with the result that his original conclusions are confirmed. He writes, "As a matter of fact, I am cultivating the spores between glass-slips; some have already germinated!"—ED.]

NEW EXPERIMENTS ON THE SEASONAL DIMORPHISM OF LEPIDOPTERA.

BY DR. AUGUST WEISMANN.

(Translated from the German by W. E. NICHOLSON, F.E.S.)

(Continued from p. 157.)

VI. EXPERIMENTS WITH VANESSA URTICÆ.

First experiment with urticæ, 1886. — Two nests of young larvæ, taken before the second moult (when 4 mm. long), were reared in the incubator at 27° C., 30° C., after July 2nd. The larvæ grew with astonishing rapidity, and pupated between July 3rd and 5th.

The pupæ remained in the incubator at 26–29·4° C., and there emerged—

On July 8th, 8 butterflies.

„ 9th, 20 „

„ 10th, 10 „

„ 11th, 8 „

—
Together 46

The pupal rest was therefore only 5–6 days.

These 46 butterflies are all brilliant red, without the dark shading of the ground colour, which is especially marked with the var. *polaris*, and arises from the black scales, which are scattered between the red ones. The black spots of the fore wing are tolerably large in six specimens, but in all the rest they are relatively small. Reckoning, with Von Reichenau,* the spots on the costa as 1, 2, and 3, those in cells 1, 2, and 3 as spots 4, 5, and 6; the spots 4, 5, and 6 especially are smaller than usual. On the basis of his excellent researches on the phylogenetic significance of the marking of *Vanessa*, Dixey† has recently proposed another enumeration of these spots; he designates the spots of the costa as I, II, III, and IV, and sees in them the vestiges of rows of spots running transversely across the wing, the units of which he designates by the Arabic numerals, beginning from the costa. Reichenau's spots 4, 5, and 6 are called by Dixey 8, 7, 6; his sixth coincides with the sixth of Reichenau. I shall adopt Dixey's enumeration on account of its phylogenetic foundation.

Second experiment with urticae, 1886. — A large number of eggs and recently-emerged larvæ were found, on July 6th, on a mountain above the Giessbach, in canton Bern, 1200 ft. above the lake of Brienz, about 3000 ft. above the sea. These, when brought to Freiburg, grew rapidly in the incubator at 26–29·4° C., pupated between July 19th and 21st, and emerged between July 23rd and 26th; thus the whole metamorphosis from egg to butterfly was completed in 17–20 days.

The 36 butterflies exhibited nothing special; they were brilliantly coloured, as are all specimens of *V. urticae* with us, and they had large black spots, for the most part somewhat larger than the specimens of the first experiment. One specimen has, however, the spots 5 and 6 smaller than any example of the first experiment. I cannot anywhere recognize constant and important differences from the specimens of the previous experiment.

* Von Reichenau, "Die Züchtung des Nesselfalters," in 'Kosmos,' v. 12, p. 47, 1882.

† Frederick A. Dixey, "On the Phylogenetic Significance of the wing-markings in certain genera of the Nymphalidæ," in Trans. Ent. Soc. Lond. 1890.

Third experiment with urticæ.—As an opposite experiment to the preceding, a part of the larvæ of the second experiment were reared in a cellar at 15° C. Pupation first began on August 7th, and the butterflies emerged between August 27th and 29th.

The 10 specimens reared in this way are a little darker than those of the second experiment; the outer margin is somewhat blacker, and, before all, the spots are larger, especially spots 5 and 6, at least, in nine specimens. They are, however, still far from the var. *polaris*.

Fourth experiment with urticæ.—A nest of recently-hatched larvæ, found near Freiburg on Aug. 31st, was reared at a room temperature of 17–23° C.; after Sept. 16th it was only 17–20° C. Pupation took place between Sept. 25th and 28th.

The 22 butterflies reared are all rather bright, with small spots; in seven specimens the spot 6 is quite small, and in one of them only a suggestion; the outer margin is less dark than in the second and third experiments; and in no specimens are the spots so large as in these experiments.

The experiment, at all events, proves that the spots 7 and 6 can also turn out quite small at a medium temperature independently of heat. Hereditary predisposition therefore co-operates here also with individual differences, and consequently it cannot be said, in a particular case, how much is to be attributed to the one and how much to the other factor.

Fifth experiment with urticæ, 1888.—A nest of recently-hatched larvæ, found in the level country near Freiburg on Aug. 4th, was reared in the incubator at a temperature for the most part of 30° C.; fluctuations, however, occurred between a minimum of 25° C. and a maximum of 32·8° C. Pupation began as soon as Aug. 13th, and 8 butterflies emerged by the 18th, followed by 24 more on the 19th, 1 on the 20th, and 2 more on the 21st.

None of these 35 butterflies were especially dark; on the contrary, all were brilliantly red in the ground colour, and with relatively little black; the outer margin forms, towards the inside, a narrow regularly dentate black stripe, and the spots 6, 7, and 8 are of the usual medium size in only one specimen; in all the rest they are small up to the point of complete disappearance. Spot 6 is completely wanting in one specimen, while 7 is faint; in another 6 is faint, and 7 more distinct; these spots are unusually small with the majority. This marking closely approaches the Corsican variety *ichnusa*.

Results of the experiments with urticæ.—Experiments similar to those here described have been repeatedly carried out before. In 1880, by means of a somewhat diminished temperature, Dorfmeister obtained a powdering of the butterflies, transitions

to the var. *polaris*. Two years later W. von Reichenau* repeated and enlarged these early experiments, when he, on the one hand, let the larvæ and pupæ develop at a high summer temperature under the influence of the direct rays of the sun, and, on the other, reared them in the autumn at 5–12° C. The former produced “beautiful fiery butterflies, which approached the var. *turcica*”; the latter produced “very dusky butterflies, noticeably brownish yellow with very large black spots.” Dixey’s spots 6 and 7 especially are considerably diminished in the heat form.

It is not evident from these experiments whether the temperature exercises its influence for alteration in the colouring at any determined time of the development, since the heat or cold—as, indeed, is advisable in early experiments—is acting during the whole development.

Dr. M. Standfuss, the experienced breeder of Lepidoptera, has, however, recently published experiments with *Vanessa urticæ*. He placed the pupæ for 60 hours in a temperature of 37° C., and noticed from this an approach to the var. *ichnusa* (or *turcica*) make its appearance, although this form was never quite reached. On the other hand, he placed pupæ in a refrigerator for 32 days, and thus reared in a room, after 9 or 10 days more, dark specimens with large black spots and much blue on the outer margin; likewise, therefore, an approach to the polar form of *urticæ*.

These experiments confirm the results of Von Reichenau in general, and at the same time they show, that the action of temperature falls wholly in the pupal period.

E. Fischer also repeated experiments of this kind with *V. urticæ*, and partly reared the var. *turcica* from pupæ, which had been subjected to “a tolerably high stove temperature (34–38° C.) for only a few days.” (‘Transmutation,’ &c. Berlin, 1895.)

The few experiments which I myself have conducted with *V. urticæ*, in general, indeed, confirm these results, but they do not make so clear and striking an impression as do those of Von Reichenau especially. In the latter’s experiments all the specimens appear to have been altered each time in the same striking way. Unfortunately no details of them are given. It is possible that this is attributable to the very high temperature which Von Reichenau made use of—up to 45° C. in the sun.

But E. Fischer also, who employed a temperature up to 38° C., only reared the var. *turcica* “from a small portion of the pupæ,” as I had done in my heat experiments, where 32·8 C. was the highest employed.

* W. von Reichenau, “Die Züchtung des Nesselfalters (*Vanessa urticæ*, L.), ein Beweis für den directen Einfluss des Klimas,” in ‘Kosmos,’ v. 12, 1882, p. 46.

This may partly explain why in the first experiment six specimens showed no diminution of the spots. The *one* specimen of the second experiment, which also had the spots 6 and 7 very small without the influence of a higher degree of temperature, and, further, the fourth experiment, in which seven specimens possessed quite small spots, without the employment of a higher degree of temperature, show, however, that hereditary individual differences also play a part in it.

On this ground we dare not trust, without something further, a result apparently so striking as that of the fifth experiment, although out of 35 butterflies, which developed under a high temperature, only one exhibited spots of the ordinary size, and the 34 others had them smaller up to the point of disappearance. Strictly speaking, the contrary experiment with cold, carried out with companions of the same brood, could first satisfy us as to how much is hereditary individual peculiarity and how much the result of the temperature. Unfortunately experiment has failed me just here. To be sure the third and fourth experiments form such a pair, but the results are not so sharp as might be wished. If, however, it is taken into consideration, that specimens of *V. urticae* without spots 6 and 7, or with only faint indications of them, are only rarely seen with us in the open, the strikingly small size of these spots in 34 specimens of the fifth experiment may be considered as the effect of the high temperature. Further experiments are, however, required.

VII. EFFECT OF HEAT ON HYBERNATING LEPIDOPTEROUS PUPÆ, 1884.

In order to determine whether a high temperature acting for a longer time on pupæ, which are already undergoing their winter rest, can produce alterations in the colours of the perfect insect, pupæ of various butterflies and Sphingidæ were placed in an incubator with evaporating water on Jan. 10th, 1884, and there subjected to a temperature fluctuating between 27° and 30° C. There were the following species:—

(1) <i>Vanessa levana</i>	120 specimens.
(2) <i>Papilio podalirius</i>	4 „
(3) „ <i>machaon</i>	4 „
(4) „ <i>ajax</i>	1 „
(5) <i>Thaïs polyxena</i>	4 „
(6) <i>Doritis apollinus</i>	4 „
(7) <i>Thecla rubi</i>	2 „
(8) <i>Polyommatus amphidamas</i>	25 „
(9) <i>Lycæna argiolus</i>	4 „
(10) „ <i>iolas</i>	4 „
(11) <i>Nemeobius lucina</i>	4 „

(12)	<i>Pieris rapæ</i>	12 specimens.
(13)	„ <i>brassicæ</i>	12 „
(14)	<i>Sphinx ligustri</i>	2 „
(15)	„ <i>pinastri</i>	3 „
(16)	<i>Deilephila vespertilio</i>	2 „
(17)	„ <i>galii</i>	2 „
(18)	„ <i>euphorbiæ</i>	20 „
(19)	„ <i>dahlia</i>	1 „
(20)	<i>Smerinthus tilia</i>	4 „
(21)	„ <i>quercus</i>	2 „
(22)	„ <i>populi</i>	5 „

Single specimens of all the species emerged: the date of the following was noted:—

On Jan.	12th,	1	<i>Doritis apollinus</i>	(crippled).
„	16th,	4	<i>Polyommatus amphidamas</i> .	
„	17th,	3	„	„
„	17th,	1	<i>Papilio podalirius</i> .	
„	18th,	2	„ <i>machaon</i> .	
„	18th,	3	<i>Polyommatus amphidamas</i> .	
„	18th,	5	<i>Pieris rapæ</i>	(crippled).
„	18th,	5	<i>Vanessa levana</i>	(one crippled).
„	19th,	1	<i>Papilio podalirius</i> .	
„	19th,	6	<i>Vanessa levana</i> .	
„	19th,	3	<i>Polyommatus amphidamas</i> .	
„	19th,	1	<i>Pieris rapæ</i> .	
„	20th,	1	<i>Papilio ajax</i> var. <i>telamonides</i> .	
„	20th,	5	<i>Vanessa levana</i>	(three crippled).
„	20th,	1	<i>Pieris rapæ</i> .	
„	22nd,	1	<i>Sphinx pinastri</i> .	
„	22nd,	1	<i>Vanessa levana</i> .	
„	22nd,	2	<i>Polyommatus amphidamas</i> .	
„	23rd,	1	<i>Sphinx pinastri</i> .	
„	23rd,	1	<i>Polyommatus amphidamas</i> .	
„	23rd,	1	<i>Vanessa levana</i> .	
„	24th,	1	<i>Sphinx vespertilio</i> .	
„	24th,	1	<i>Deilephila dahlia</i> .	
„	24th,	1	<i>Vanessa levana</i>	(crippled).
„	28th,	1	<i>Papilio podalirius</i>	
„	28th,	1	<i>Deilephila euphorbiæ</i> .	
„	29th,	1	„	„
„	30th,	2	„	„
„	31st,	3	„	„
On Feb.	1st,	2	„	„
„	4th,	2	„	„
„	6th,	1	„	„
„	8th,	1	„	„
„	11th,	1	„	„

On Feb. 12th,	1	<i>Deilephila euphorbiæ</i> .
„ 15th,	3	„ „ „
„ 17th,	1	<i>Sphinx pinastri</i> .
„ 20th,	1	<i>Deilephila euphorbiæ</i> .
„ 21st,	1	„ „ „
„ 25th,	10	<i>Vanessa levana</i> (nine crippled).
„ 26th,	1	„ „ „ (crippled).
„ 28th,	1	<i>Sphinx pinastri</i> (crippled).

I could not detect any departure from the normal marking or colouring in any of the species which emerged in the incubator. The influence of a temperature of 27–31° C. was *nil* on pupæ already several weeks old in relation to the form of the perfect insect. On the other hand, the development was considerably hastened with all, but, as is general in forcing pupæ, in a very irregular manner.

VIII. GENERAL PART : RECAPITULATION.

Although I am far from considering the few experiments, which I could here put forward, as sufficient for reaching a decisive settlement of our opinions on seasonal dimorphism, yet I cannot forbear arranging them, provisionally at least, in reference to our general conceptions of the subject. When in the year 1875 I first set about investigating the ways of this striking and yet so long neglected phenomenon, I assumed that it was to a certain extent obvious, that this kind of dimorphism was everywhere a direct result of the various direct influences of climate, principally of the temperature, as it affects in regular alternation the spring and the summer brood of many-brooded species. I had also well considered the other possibility, that dimorphism connected with the time of the year might also depend upon the *indirect* influence of the changing environment, *i.e.* that it might depend upon *adaptation* to the varying environment of the butterfly according to the time of year. I then said: “It is not inconceivable in itself, that phenomena occur among the Lepidoptera analogous to the winter and summer clothing of alpine and arctic mammalia and birds, only with the difference, that the change in colouring does not arise in one and the same generation, but alternately in different ones.” But at that time the fact that the *upper side* of butterflies, which is usually not adaptive, can be very variable just in summer and spring, sometimes more so than the adaptive under side, appeared to me to contradict this adaptation of seasonal dimorphism. Yet it was the fact that the one or the other seasonal form could be produced artificially by the operation of a higher or a lower temperature, *i.e.* the stamp of the winter form might be impressed on the summer brood and *vice versa*. I therefore concluded that it was the measure of heat, which was acting during

the pupal period, which directly formed the species in one way or the other, and I felt the more justified in so doing, as the climatic varieties form a parallel to the seasonal forms, and as the former must without doubt be referred to the direct influence of climate, especially of temperature.

Thus, for example, *Chrysophanus phlœas* is seasonally dimorphic in Sardinia and at Naples; the summer form, which develops during the summer heat, is very dark, almost black, but the spring form corresponds with our German red-golden *phlœas*.

Although to-day I still look upon this view as correct, and a directly altering effect of temperature as proved, yet I have gradually been convinced, that this is not the sole origin of seasonally dimorphic variability, but that there is also *adaptive seasonal dimorphism*. We must, I believe, distinguish *direct* and *adaptive* seasonal dimorphism; and I see in this distinction an important advance, which before all places us in a position to explain the results of the various experiments undertaken by myself and others in a much more satisfactory manner.

I have already pronounced this view in a lecture* delivered at Oxford in the beginning of 1894, and I have sought to show that adaptive seasonal dimorphism, which I had previously only put forward as possible, does *actually* occur. The example there given for perfect insects was, indeed, only a hypothetical one, *viz.* the case of *Vanessa prorsa-levana*; but for larvæ, at least, I can select an example from Edwards's excellent work on the North American butterflies with tolerable certainty, *viz.* that of *Lycæna pseudargiolus*, which will be more accurately discussed later on. I did not then know, what I learnt shortly afterwards from an interesting little pamphlet of Dr. G. Brandes, that cases of seasonal dimorphism had been known for a long time among *tropical* butterflies, and that among these, at least, one of the seasonal forms depends upon the assumption of a special protective colouring. Brandes maintains, with justice, that the view hitherto widely held among us is erroneous, according to which seasonal dimorphism was not to be expected in tropical countries, since the alternation of seasons is absent there. Periods of rain and drought, at least for many tropical countries, form such an alternation very sharply. At any rate, Doherty and, somewhat later, de Nicéville, have pointed out, for Indian butterflies, a series of seasonally dimorphic species, not merely by observation of the alternation of the two forms in nature, but by rearing the one form from the eggs of the other; thus among Satyrids of the genera *Ypthima*, *Mycalesis*, and *Melanitis*, and for the species of *Junonia*, it is accepted as proved; and in all these cases the difference between the two forms principally con-

* 'Äuussere Einflüsse als Entwicklungsreize,' Jena, 1894.

sists in the fact that the one form seems like a dry leaf on the under side, while the other possesses another marking, and at the same time a number of ocelli.

Without engaging in the controversy as to the biological value of these ocelli, I do not for a moment doubt but that the colouring with ocelli is also an adaptive one, possibly protective or intimidating colouring. If one of the two forms had no biological adaptive significance, it could no longer exist; the single adaptive one would have replaced it. But it is obvious that the appearance of complicated details of marking and colour, such as ocelli are, cannot be simply the direct effect of heat or cold, drought or humidity. *These influences are not the actual causes of such formations, but only the stimulus, which sets their primary constituents free*, i. e. induces their development, as I tried to demonstrate in the lecture above noted. As the sufficient cause of the winter sleep of the marmots does not lie in the cold, but in the organization of the animal which is adapted to the cold, and as the cold only brings the existing predisposition to winter sleep into play, so among these butterflies with adaptive seasonal dimorphism the display of the one or the other marking is apparently connected, partially at least, with one of the above named outward influences, although in reference to these tropical butterflies we do not yet know to which of them.

We recognize *temperature as the stimulus to development* with the cases of adaptive seasonal dimorphism of our indigenous butterflies, as in all cases of seasonal dimorphism, which have been hitherto proved experimentally, it is always high and low temperature, which gives the outward impulse to the appearance of the one or the other form, where this impulse did not come exclusively from *within*.

There are therefore two different sources of the appearance of seasonal dimorphism; on the one hand, the *direct action* of alternating external influences, *viz.* temperature, can bring about this change in the outward appearance; and, on the other hand, the processes of selection. It is therefore necessary to consider these two kinds of seasonal dimorphism separately. It will certainly not always be easy to decide between them when a particular case has to be dealt with, as at present it is not always possible to say whether a colouring or marking has a definite biological value or not. Both causes also may co-operate in one species.

Direct seasonal dimorphism.—Among our indigenous species *Chrysophanus phleas* may be certainly considered an example of this. In the first place, the seasonal differences relate only to the upper side, and then a biological value can scarcely be discovered for the black powdering of the summer form, *eleus*. Moreover, it occurs in both sexes.

On this point the experiments of Merrifield and my own are

in complete agreement as to the fact that the influence of a higher temperature on the pupæ makes our German butterflies, which are alike in both broods, somewhat darker; but my experiments with a Neapolitan brood have proved that this brood becomes red-gold through cold, and powdered with black through heat, but that the latter character appears at a much lesser temperature, and far more strongly than in the German brood. One cannot, therefore, forbear ascribing a somewhat greater sensitiveness for this colour reaction from temperature to the southern colony of *phleas*, than to the northern, particularly since a long subjection to a low temperature nevertheless permits the Neapolitan brood to appear with more black on the margins of the wings, than the German form ever possesses. Theoretically, therefore, this statement of the fact can be expressed on the ground of my theory of heredity somewhat in the following manner: the determinants (Bestimmungsstücke) assumed in the germ-plasm of the scales concerned have been a little altered in southern colonies of the species in the course of generations by the constantly recurring high temperature, so that they tend to the formation of black scales in a stronger degree than with the northern colonies of the species. But among the latter also these determinants can be induced to form black scales, if they are affected by a high temperature at the time during which the formation of colour is going on in the wings, *i. e.* in the last days of the pupal rest. The alterations of the scale-determinants are consequently *twofold* in this case; *on the one hand* the climatic temperature acts upon them so long as they, still enclosed in the germ-plasm of the egg or the sperm, are contained in the reproductive organs of the insect, and this operation of altering must first be a minimal one, which only increases to a noticeable extent by accumulation during a long course of generations; were it not so, the spring brood from Naples could not still be always comparatively free from black powdering, as is the case. But secondly, the temperature effects alterations in the scale-determinants in question, when they are already enclosed in the rudiments of the wings of the pupa, and are on the point of forming the scales of the wing, and this effect is a very much stronger one. But while the former must be transmitted from one generation to another by the continuity of the germ-plasm, and can therefore also gradually accumulate and increase, the latter cannot be inherited, as the wings and wing-scales of a particular individual die with it, and this accounts for the pure golden colour of the spring form of the south.

I might lay especial stress on Merrifield's observation, according to which the last five or six days of the pupal period are the *critical* ones, *i. e.* for deciding on the colour which should arise.

Two of Merrifield's experiments (Nos. V. and VI.) appear to

me to prove this. Pupæ, which had been kept for ten weeks at 4° C.,* were half of them then brought into a temperature of 13° C., in which they emerged after 34–36 days as the pure golden spring form; the other half of the iced pupæ were brought into a high temperature (32° C.), where they emerged in 5–6 days, and, indeed, as black powdered forms approaching the form *eleus*. The latter experiment, to be sure, was only made with five or six specimens, and in the first about half the pupæ died, or emerged crippled; but yet the result is so definite, that it may well be regarded as conclusive. Nevertheless, I should have liked to have repeated it once more with a larger number of individuals, if I could have obtained material for it. The question of the *critical period* for the influence of temperature appears to me the more important, since with other species I have found just the opposite, viz. that the *beginning* of the pupal period determines the form of the dimorphic butterfly, and since it appears to me possible, on theoretic grounds, that this may be different in *direct* and in *adaptive* seasonal dimorphism.

It is conceivable, on *direct* alteration of climate, that the effective temperature must set to work, when the colours of the wings are beginning to form, as how should their alteration be otherwise brought about, if not by changes of the chemical processes, which underlie the production of colour? The determinants of the scales will therefore be influenced in this way at the moment, in which they become active; they undergo various small modifications by different temperatures, which lead to an alteration in the course of the colour-chemistry. But whether with many species, which appear to be altered directly by the climate, quite other factors do not co-operate to influence the colour-chemistry, is another question, whose solution is certainly not possible at the present time. I might, indeed, consider it probable from the result of Experiment VIII., in which hibernating pupæ of a large number of the most various species of Lepidoptera were kept at 30° C., and thus induced to emerge earlier. None of them exhibit anything special in marking or colouring, although here certainly an increased temperature was operating just at the time when the formation of colour is going on. This points to the fact, that with the various considerable alterations, which Dorfmeister, Merrifield, Standfuss, E. Fischer, and many others have produced by cold or a higher temperature in many butterflies, it is not the chemical processes on the formation of colour itself, but rather the various predispositions to the colour-patterns of their ancestors still contained in the germ-plasm, or later on in the rudiments of the wings of the species in question, which might

* A reference to Merrifield's paper shows that this should be 0.1° C. (Translator).

be stirred to activity in different ways, just as also Dr. Dixey has interpreted—certainly with justice—many of Merrifield's cold and heat aberrations as partial reversion to ancestral characters. With *Vanessa io*, at least, a quite striking agreement in the marking of the fore wings with *Vanessa urticae* and its nearest allies is brought about by the action of cold, which does not admit of another explanation. Standfuss and E. Fischer also reared an exactly similar aberration by the continued action of ice upon the pupæ, and they also interpret it as reversion in the direction of *Vanessa urticae*.* Moreover, it seems to me important, that all these experimentalists had to first subject the pupæ, after the long cooling (on ice 8–42 days), to a higher temperature for a longer time before they emerged. With Merrifield it still required 18 days of a temperature of 16° C., with Standfuss 9–10 days at “the room temperature.” *The chemical processes, therefore, of the formation of colour did not go on here under the influence of cold, but of medium heat—another sign, that it is here a question of the indirect effect of cold.*

Thus it is also in all probability in the *second kind of seasonal dimorphism—the adaptive*. Two different patterns will be present here close to one another as rudiments in the germ-plasm, and the question as to which of the two kinds shall become active is decided in the period immediately after pupation, not later. It can scarcely be otherwise, as with this kind of seasonal dimorphism not merely the quality of the colour is concerned, but also the whole pattern,—in many cases, indeed, even the form of the wing (in a slight degree with *Pieris napi*, in a much stronger degree, according to Edwards's sketches and figures, with the American *Grapta interrogationis* var. *fabricii* and var. *umbrosa*). All the processes of the growth of the wing must, therefore, be altered by it, and it is evident that this can no longer happen, if the form of the wing already exists in a complete state.

However, before I pass on to the closer discussion of adaptive seasonal dimorphism, I might cast a glance at the results on *Vanessa urticae*. This species, indeed, is nowhere seasonally dimorphic, but is certainly climatically polymorphic, *i. e.* it has a dark polar form, var. *polaris*; a bright red southern form, var. *ichnusa*, with very small black spots, sometimes entirely absent; and an intermediate form which belongs to Central Europe. These differences also seem to depend on the direct action of the different temperature which affects the pupæ. The existing experiments, indeed, are still very incomplete; above all, experi-

* M. Standfuss, ‘Ueber die Gründe der Variation und Aberration des Falterstadiums bei den Schmetterlingen,’ Leipzig, 1894. Sonderabzug aus Insectenbörse. E. Fischer, cand. med., ‘Transmutation der Schmetterlinge in Folge Temperaturveränderungen,’ Berlin, 1895.

ments entirely with the Sardinian *ichnusa* and *polaris* form are still required; but we have still succeeded in several cases in more or less completely producing the *ichnusa* form by heat and the *polaris* form by cold from our intermediate German form.

The darker colouring of the polar form scarcely depends on adaptation, or is Lord Walsingham's interpretation correct, according to which the duskier colouring of the arctic butterflies is considered as a protection from temperature? In this case we must expect that the dark colouring of this var. *polaris* still remains constant at a high temperature, as the scale-determinants in question would then be directed once for all to the production of black. Before experiments have disproved such a state of affairs, I might regard the change in the darkness of *Vanessa urticæ* as the direct result, biologically without significance, of the action of different degrees of temperature on the wings in the course of development. But heat-experiments with the arctic brood would be quite as desirable as cold-experiments with the Sardinian.

Thus we have before us, in *Chrysophanus phlæas* and *Vanessa urticæ*, species which, according to the present position of our view, exhibit *direct* seasonal or climatic dimorphism; and it is interesting, that—as I brought forward years ago—the direct action of a higher temperature has just the opposite result in the one species to what it has in the other: *phlæas* is blackened by heat, *urticæ* becomes brighter and more fiery from the same cause. We cannot, therefore, say generally how often and how repeatedly this has happened: that heat darkens the colours of butterflies.

(To be continued.)

REMARKS ON "ADDITIONS TO THE BRITISH LEPIDOPTERA DURING THE PAST TEN YEARS."

BY EUSTACE R. BANKES, M.A., F.E.S.

As the list of "Additions to the British Lepidoptera during the past Ten Years," published in the 'Entomologist,' xxvii. 342-5 (1894), was to some extent compiled from notes and information supplied to Mr. South by myself, I may perhaps be allowed to supply a few omissions that I notice, and corrections, &c., that should be made. Species formerly omitted are marked thus *.

SESIA CONOPIFORMIS, Esp., must apparently be struck out. Although Mr. C. W. Dale has not yet cancelled his note in Entom. xxvii. 245, I learn that it was decided at the meeting of the Ent. Soc. London, at which he exhibited the specimen

recorded as *conopiformis*, that it was not that species, though its identity was not definitely ascertained.

CARADRINA SUPERSTES, Tr. Most of Mr. Tutt's determinations in Brit. Noct. Vars. i. 148-9, having been cancelled, it is advisable to substitute the reference "Ent. Rec. vi. 203-4," where *superstes* is established as British.

*THALPOCHARES PAULA, Hb.,—with the references "E. M. M. x. 19; Ent. Ann., 1874, p. 156,"—should be inserted after *Plusia moneta*. Mr. South altogether omits this species from the Ent. Syn. List,[†] and also from the "Additions," though I sent up its name for insertion.

HERCYNA PHRYGIALIS, Hb., should not be admitted to the British list on the evidence offered in E. M. M. xxviii. 264.

MELISSOBLAPTES GULARIS, Zell. I failed to persuade Mr. South to omit this insect, though he acknowledged my protest by inserting a "?" before it. He entered it on the strength of Mr. J. H. A. Jenner's note in Entom. xxv. 286, but it is there clearly stated that the moths emerged at Lewes from larvæ or pupæ imported direct from Japan to London, and they were therefore not of British origin. No evidence of the species having established itself in this country has yet been produced.

*ANTITHESIA CARBONANA, Brt., with the reference "E. M. M. xxiii. 4," should be inserted after *Tortrix decretana*. The name *carbonana* was used by Doubleday in his List, but he sunk it in his Sppl. List as a synonym of *fuligana*, and it is uncertain to what insect he applied it; in any case Doubleday's name cannot stand, because it is unsupported by any figure or description. Mr. Barrett, however (E. M. M., l. c.), uses the name for the fen insect, attached to *Stachys palustris*, which he there separates from *fuligana* and describes as *n. sp.*

RETINIA RETIFERANA, "Hein." For "Hein" read "Wk." Mr. Barrett inaccurately attributes the name to Heinemann in E. M. M. xxix. 113. Wocke pointed out that *margarotana*, Hein., was not identical with *margarotana*, H.-S., and gave the name *retiferana* to the former species.

GELECHIA SEMIDECANDRELLA, "Threlfall." For "Threlfall" read "Stn. & Thrfl." In E. M. M. xxiii. 233, Threlfall names the species, but, instead of describing it himself, quotes with due acknowledgment a MS. description drawn up by Stainton. It is, therefore, a case of joint authorship.

LITA OCELLATELLA, "Sta." For "Sta.; Ent. Ann. 1859" read "Boyd, Ent. Week. Intell. iv. 143 (1858)." Since the Entom. "Additions" were published, coloured figures of imago, larva, and tenanted portion of food-plant of this species, as well as of its allies *L. suædella* and *L. plantaginella*, have appeared in Proc. Dors. N. H. & A. F. C. xv. pl. adv. p. 59.

[†] Included in "Addenda et Corrigena."—R. S.

ACROLEPIA ASSECTELLA, Zell. As the history of the specimen recorded in E. M. M. xxx. 291 is unknown, there is not sufficient evidence for admitting this species into the British list. This latter remark applies also to *Xystophora servella*, which I purposely omitted, although one example was bred in a London suburban greenhouse (E. M. M. xxv. 361), and two moths taken near King's Lynn may perhaps represent that species (E. M. M. xxx. 51).

ORNIX FAGIVORA, "Sta." For "Sta." read "Frey."

COLEOPHORA FLAVAGINELLA, Zell. Add reference to coloured figures of imago and larval case in Proc. Dors. N. H. & A. F. C. x. pl. *adv.* p. 197, figs. 5, 5a.

**COLEOPHORA ARTEMISIELLA*, Scott, Ent. Ann. 1861, p. 89; Trans. Ent. Soc. Lond., N.S., v. 409-10, pl. xvii., figs. 2 m, 2 a, should be inserted. This species—so distinct from *C. artemisicollis* and *C. maritimella*, with which it is sometimes confounded—was omitted by Mr. South from the Ent. Syn. List, and also from the "Additions," though I sent up the name and reference for insertion.

LITHOCOLLETIS ANDERIDÆ, Flehr. Add reference to coloured figure of imago in Proc. Dors. N. H. & A. F. C. xi. pl. *adv.* p. 47, fig. 8.

LITHOCOLLETIS DISTENTELLA, "Frey." For "Frey," read "Zell."

NEPTICULA AUROMARGINELLA, Rdsn. Add reference to coloured figure of imago in Proc. Dors. N. H. & A. F. C. xi. pl. *adv.* p. 47, fig. 10.

NEPTICULA FILIPENDULÆ, Wk. Omit the "?" inserted before the name in Entom. "Additions." I now learn from Mr. W. H. B. Fletcher that he entered the "?" in his List (Trans. Chich. & W. Sussex N. H. Soc., No. 5) not from any doubt about the identity of his insect with *filipendulæ*, Wk., but in hesitation whether *filipendulæ* was truly distinct from *poterii*, Stn. In any case *filipendulæ* stands secure at present.

NEPTICULA GEI, Wk. For "*gei*, Wk." read "*fragariella*, Heyd." Dr. Wocke described *gei* as *n. sp.* in 1871 in the well-known Catalogue which he compiled with Dr. Staudinger, but himself afterwards sunk it as identical with *fragariella*, Heyd., in the concluding part of the 'Schmet. Deutsch. und der Schweiz,' which he brought out in 1877 after the death of Von Heinemann.

In the list of "Additions, &c.," *Catocala electa*, *Lita ocellatella*, and *Nepticula rubivora* should have each been marked with an asterisk as having been omitted from the Ent. Syn. List (1884).

The Rectory, Corfe Castle: February, 1896.

P.S.—*ARGYRESTHIA ILLUMINATELLA*, Zell., which was inserted in the "Additions" (*l.c.* p. 344) on the strength of the note in E. M. M. xxx. 51, must now disappear from the British List (*vide* E. M. M. xxxii. 98).—F. R. B., May 4th, 1896.

ON THE IDENTIFICATION OF *DANAUS PLEXIPPUS*, LINN.

BY W. F. KIRBY, F.L.S., F.E.S., &c.

CONSIDERABLE confusion has arisen, and still prevails, respecting the butterfly which ought to retain this name; and it may, therefore, be useful to set forth the full evidence.

The original description (Syst. Nat., ed. x., i. p. 471, n. 80), with the references, &c., is as follows:—

“P. D. alis integerrimis fulvis; venis nigris dilatatis, margine nigro punctis albis.

Pet. Mus. 58, n. 527.

Sloan. Jam. 2, p. 214, t. 239, f. 5, 6.

Catesb. Car. 2, t. 88.

Rai. Ins. 138, n. 3.

Habitat in America septentrionali.

Alæ primores fascia alba, ut in sequente, cui similis.”

The species alluded to in the last line is *Danaus chrysippus*, which has a white subapical band on the fore wings, a character not exhibited by any American species.

It is to be noted that Linné does not add the letters “M.L.V.” to either species, leaving it to be inferred that they were not in the Queen’s Collection at the time.

In 1764 Linné published his descriptive Catalogue of the Queen’s Collection (Mus. Ludov., Ulric. Reginae, &c.); and at p. 262 describes *Papilio plexippus*, quoting Sloane, Catesby (*with doubt*), and Petiver. The most important passages here are the following:—

“Habitat in America septentrionali. P. Kalm, Meus e China.”

“Alæ Primores apicibus late nigris in qua parte, præter puncta alba, etiam Fascia alba interrupta ex Maculis quinque.”

This would lead us to infer that Linné’s type was a Chinese specimen, which alone could be fairly compared with *D. chrysippus*, and to which alone the sentence beginning “Alæ Primores” could apply.

This is the view taken by Dr. Aurivillius in his “Recensio Critica Mus. Lud. Ulr.” p. 70, published in the Swedish ‘*Vetenskaps Handlingar*,’ ser. 2, vol. xix., no. 5. He adds the further evidence that two specimens of the Asiatic insect still exist in the remnants of the Queen’s collection, and that it is figured under the name *plexippus* in an unpublished plate by Clerck.

The notice of *P. plexippus* in Linné, Syst. Nat. (ed. xii.), i. (2), p. 767, n. 117 (1767), only differs from that in the 10th by the addition of the words “Mus. Lud. Ulr. 262,” and by the reference to Ray being placed first.

What is the evidence in favour of the name *plexippus* being applicable to a North American species?

Firstly, Aurivillius quotes a very old description of the North American insect, which Linné received from Kalm, from an old MS., with a reference to Catesby. But there is no evidence that the name *plexippus* was affixed to it; and Linné's own words seem to imply that he considered his Chinese specimen the type, especially keeping in view the line appended to the original description comparing the butterfly to *chrysippus*. But can we set aside the American locality, and the reference to books in which American species are described or figured? And what is the species mentioned in these old books which Linné quotes?

Some of Linné's references are wrong, to begin with. To take Petiver first: we find, in Petiver's 'Museum,' p. 52, n. 527, a butterfly from Carolina briefly described, which he figured afterwards in his 'Gazophyllacium,' pl. 15, fig. 9. If we admit the claims of American butterflies, this should be the typical figure; but it represents *Limenitis archippus*, Cramer! Sloane, of course, figures *Anosia jamaicensis*, Bates; and it is not till we come to the third quotation (Catesby), which Linné afterwards quoted with doubt, that we meet with the common North American *Anosia menippe*, Hübner. Lastly, Ray's description belongs rather to *A. jamaicensis* (which he actually called the butterfly), than to any other species; though he also quotes Petiver's notice of a butterfly from Carolina, which, as we have seen, was *Limenitis archippus*.

Under these circumstances, I am still of opinion that it is better to regard the eastern *Danaus*, figured by Cramer as *Papilio genutia*, as the true *Papilio plexippus*, of Linné, on the strength of his comparing it with *D. chrysippus*; and having regard to Clerck's figure, and the ostensible types; and to call the common American species, now becoming naturalised among us, by the name of *Anosia menippe*, Hübner.

DAMP COLLECTING-BOXES AND LAUREL-JARS SUPERSEDED.

BY H. GUARD KNAGGS, M.D., F.L.S.

IN your issue for October, 1894 (Entom. xxvii. 294), Mr. Philip de la Garde drew attention to the use of naphthalin as a means of keeping freshly-caught insects relaxed without damp, even when collecting under a tropical sun. This statement was referred to (E.M.M. xxxi. 21) in January, 1895, in a foot-note to my description of Mr. Clark's rapid and wonderful method of relaxing dried specimens by the application of wood-naphtha to their thoraces. It has been a matter of surprise to me that none of your readers would seem to have spotted the paragraph in

question. To me it appears to be one of the most interesting discoveries that has been brought before the entomological public for many a year; for it had long been my hope that some vapour might be found to take the place of aqueous moisture, of which I confess to having a horror, even when its evil effects are, to a certain extent, mitigated by the addition of carbolic acid. It is, therefore, with great satisfaction that I am enabled, from my own experience, to confirm Mr. de la Garde's observations in every respect.

In a well-closed vessel containing a fair amount of naphthalin, insects will undoubtedly keep supple for a long time; a cockroach killed in a cyanide-bottle, to which four crushed marbles of albo-carbon had been added, displayed no indication of *rigor mortis*, and a month afterwards was as pliant as when first killed—even more so; and yet there were not the slightest signs of putrefaction, disarticulation, or mildew. A *Biston hirtaria*, literally soured with a drachm of chloroform, in which it was allowed to remain for two hours, and then put into a well-stoppered bottle with a quarter of an ounce of sublimed naphthalin, was, in a fortnight afterwards, in perfect condition for setting out. It would seem, therefore, that, in addition to its power to keep freshly-caught insects relaxed, naphthalin has the effect of counteracting the rigidity caused by cyanide, and even of an over-dose of chloroform; and no doubt, if it were combined (either mixed or in a separate compartment) with cyanide in our killing-bottles, the latter would be considerably improved thereby.

Combined with a few drops of wood-naphtha, as in my suggestion for "Dry-relaxing" (E. M. M. xxxii. 101), it will be found very useful for relaxing small *Micros*, which will not bear the application of wood-naphtha, or indeed of any other fluid.

Fortunately the relaxing action of naphthalin, alone, upon *dried* specimens is quite insufficient to prevent the continuation of its use as a valuable prophylactic against mites and mould in our cabinets.

Let me persuade your readers to give naphthalin a trial, for I am morally certain that it will henceforth take the place of the damp collecting-box and the laurel-jar.

Mr. de la Garde has conferred a great boon upon entomologists by his discovery, and it seems to me quite safe to predict that naphthalin, like many other gas products, has a grand future before it.

London: May, 1896.

CHRY SOPHANUS PHLÆAS, AB.



THE specimen of *C. phlæas* figured above is from the collection of the late Mr. J. A. Cooper, of Leytonstone; it was captured a few years ago on Wanstead Flats.

In October, 1893, the memorable *phlæas* year, Mr. Sabine sent me for figuring some aberrations of the species which he had recently taken; two of these are represented on p. 305, vol. xxvi. of the 'Entomologist.' Upon reference to these figures it will be seen that fig. 1 bears a remarkable similarity in the character of the aberrant markings to the figure now given; but in Mr. Sabine's specimen the variation is confined principally to the under surface, while in the present specimen the variation only appears on the upper surface, the under surface being completely normal. The upper surface of the primaries only are adorned with bold black club-like markings, adding greatly to the beauty of the insect.

A somewhat parallel aberration of this species is also figured, Entom. xi. p. 25, in which the usual markings are greatly exaggerated, forming a broad black band across the primaries. In the description given of the specimen it is stated that "the lower wings are marked as usual, and the markings of the under side are entirely normal"; thus agreeing exactly with the specimen now figured.

F. W. FROHAWK.

NOTES AND OBSERVATIONS.

PAIRING OF *HYBERNIA RUPICAPRARIA*.—Though I cannot answer Mr. Thornehill's question *re* the above (*ante*, p. 130) with absolute certainty, I think it most probable that pairing takes place in the early morning. I happened to be out at 4 a.m. on Jan. 30th last, and the males were then busy on the wing, and continued so for at least two hours, as I again saw them on my return home at 6 a.m. I had no time then to search for the female, which I afterwards regretted, as it would have cleared up any doubt on the point.—N. F. SEARANCE; Mitcheldean, Gloucestershire, April 20th, 1896.

BREPHOS NOTHA THREE YEARS IN THE PUPA-STATE.—In June, 1893, I found a few larvæ of this species upon aspen, and the following April bred some of the moths. In April, 1895, I bred one, and last month another, from the same batch of larvæ.—GERVASE F. MATHEW.

NOTE ON *PORTHESIA CHRYSORRHŒA*.—Ten years ago this species used to occur sparingly in this neighbourhood, but I have not seen any since. In the spring of 1894 I found a few larvæ near Sittingbourne, but did not see any last year. This year, however, I obtained a small brood. Is this species dying out in this country? Twenty years ago it used to be abundant in most of the eastern counties, but I have not noticed it mentioned among lists of captures or duplicates for a very long time.—GERVASE F. MATHEW; Dovercourt, May 11th, 1896.

ARGYNNIS *NIOBE*.—The Rev. O. Pickard-Cambridge, writing (*Entom.* xxix. 148) of the specimen of *A. niobe* captured by Mr. Gerrard in the New Forest, says, "Was not the so-called *niobe* afterwards ascertained to be only a variety of *adippe*?" I cannot imagine how such a mistake has got about; but even Mr. Barrett falls into it in his '*Lepidoptera of the British Islands*,' vol. i. p. 166. The specimen in question, which I obtained from the Rev. Windsor Hambrough, and is now in my collection, is an unmistakable *niobe* var. *eris*, a variety which seems to be commoner than the type in some places. No one acquainted with both species could possibly mistake it.—C. A. BRIGGS; 55, Lincoln's Inn Fields, May 14th, 1896.

A CENSUS OF BRITISH INSECTS.—The first column is taken from Stephens's '*Catalogue of British Insects*,' published sixty years ago. The second refers to those of the present time. Had not Stephens reckoned such a large proportion of varieties as species his numbers would not be near so high as they are, especially in the Neuroptera and Orthoptera:—

	Stephens.	Dale.
Coleoptera ...	3300	3280
Hymenoptera ...	2054	4700
Lepidoptera ...	1838	2090
Diptera ...	1671	3000
Hemiptera ...	704	1046
Neuroptera ...	370	246
Orthoptera ...	65	42
Total ...	10,002	14,404

—C. W. DALE; Glanvilles Wootton.

NOTE ON *VANESSA ANTIOPA*.—Years ago it was considered to be a stroke of fortune when a collector caught an English "Camberwell Beauty." Judge then of my astonishment, in a country-side home in Australia, to see a store-box full of this butterfly. The owner shocked my youthful dreams by making me his *confidante*. He informed me that in the old country he had done well by them. He first of all imported ova from America in hollow pieces of cane. These were duly hatched and reared. Part were turned loose in the imago, others kept for trade. Thus the specimens were bred on English soil! I remember one year four hundred being the recorded number seen or captured in England. And I further remember a noted difference between British and continental specimens, the one being of a yellow tinge, the other whiter cream. *Deiopeia pulchella* and many rare British moths swarm in Australia. How easy to send ova, and turn

the imagines loose. If foreign insects caught on British shores were not reckoned to be of greater value than those at home, there would doubtless be less heard of new British species. The wonder is, with such opportunity and temptation to gain, that many more cases have not occurred.—T. P. LUCAS; Brisbane, Australia.

THE NEW FOREST CICADA.—Perhaps it will probably surprise Mr. Cambridge and other entomologists of the present day to hear that this fine species (*Cicada hamatoides*, ante, p. 147) was taken by Mr. Bydder in the New Forest as long ago as 1815. There is an admirable figure of it in Curtis's 'British Entomology,' from specimens taken in the New Forest by Mr. Curtis and my father in June, 1831. A remarkable fact in connection with this species is that it is more than double the size of *Ledra aurita*, the second largest species of the Homoptera in Britain.—C. W. DALE; Glanvilles Wootton, May 4th.

CICADETTA MONTANA, Scop. — The question of the first recorded occurrence of our only British Cicadid having been referred to by the Rev. O. Pickard-Cambridge in his interesting paper on Brockenhurst (ante, pp. 146–150), I may say that the earliest record with which I am acquainted is that of Samouelle, in his 'Entomologist's Useful Compendium' (1819), where, on p. 229, he says, "The only species known to inhabit this country was lately discovered by Mr. Daniel Bydder near the New Forest in Hampshire." There can be no question as to the identity of the species, as he gives a recognisable figure of it (op. cit. pl. ii. fig. 2) under the name of *Cicada anglica*. — JAMES EDWARDS; Colesborne, Cheltenham, April 4th, 1896.

NOTES ON VARIOUS INSECTS.—*Eulophus endocerchus*, Walk. This is a synonym of *Clinx gallacum*, L., and is a parasite of the Cynipidæ.—*Eulophus enmagamis*, Walk. This I have bred from *Coleophra flavaginella*.—*Ceratopogon candidatus*, Winn. This I have bred in number from the pith of teasel-stems.—*Ceratopogon bipunctatus*, L. This occurs commonly under elm-bark.—*Scatopse albitarsis*, Zett. This I have bred from the pith of burdock-stems.—*Dilophus vulgaris*, L. Of this I have an hermaphrodite, with the wing on the right side dark, on the other light.—C. W. DALE; The Manor House, Glanvilles Wootton.

"APPLE-TREES AND WINGLESS MOTHS."—In reply to Mr. Mitchell's query (ante, p. 127), I beg to say I have seen wingless moths by night; in fact, since this district can claim an additional species, *Nyssia zonaria*, several of which are depositing eggs in a box as I write by gaslight, my advantages are rather exceptional. On three points Mr. Mitchell and I will agree—the females are more active by night than by day, they have longer and stronger legs than the males, and they are quite capable of walking to the end of a larger oak-branch and depositing their eggs, even although the activity of geometers by night is well known to be limited. The great question is—Do these concessions account for the wide distribution of larvæ, or, in other words, for all the distribution? Clearly not, because in the correspondence on the subject (Entom. xxvi. 20) it is stated, in no hypothetical language, that males have been seen—the method is not described—to carry up the females. The statement is borne out by one of the 'Standard' correspondents, who declares, "All fruit-growers

know that a small percentage of female moths will always be carried up by the males." Another goes so far as to say the cart-grease ring round the trees "is of no use at all." Here, then, is the additional aid towards wide distribution. As to why males are not frequently captured on the wing when carrying up the females, I should say it is because the species is not often netted.—J. ARKLE; Chester.

ABUNDANCE OF *HEPIALUS LUPULINUS* LARVÆ, AND A PARASITE THEREON.—The past winter has been noted for its abundance of the larvæ of the garden-swift moth (*H. lupulinus*). They have been and are still in many parts of Kent attacking the roots of various plants, especially the strawberry. Amongst those sent me I have noticed the constant habit, when attacking that fruit-plant, of eating right up into the crown of the plant, as we see in others of this genus. In the first samples sent me I failed to see any signs of the pest until the root-stocks were split up. They destroy the plants entirely, and also eat the rootlets of the runners. In the majority of instances they, however, live free in the soil, feeding upon the rootage from the outside, especially when they are attacking mint, which seems a favourite food-plant. Notices of this attack have been sent me from various places in Kent, from near Dorking, and near St. Neots. Amongst two packages sent from Canterbury and Kimbolton, I found several specimens of *Anthocoris*, which evidently destroy the *Hepialus* larvæ underground. Their method of procedure is to crawl upon the larva's back, and then plunge their beaks into the skin behind the head. Soon after this operation the larvæ seem to sicken and die, numbers that were sent me from Canterbury last month having evidently succumbed on the journey from this cause. To make certain, however, I kept a number of these larvæ with a few of the *Anthocoris* sent, and watched them in this carnivorous habit. The larvæ seemed to know what was going to take place, for the instant the "bug" got upon the back of its prey the latter wriggled backwards in that curious manner common to the *lupulinus* larvæ. This hemipteron moved about in the loose earth amongst which the garden-swift caterpillars abound with considerable ease.—F. V. THEOBALD; Wye Court, Wye, April 24th, 1896.

AN UNUSUAL HABITAT FOR *COSSUS LIGNIPERDA* LARVÆ IN WINTER.—On the 23rd of this month (April) some larvæ, full-fed, of the goat-moth were forwarded to me from Bruton in Somerset, that were found about eight or nine inches below the ground and about four feet apart, in soil that was used last year for dahlias and sunflowers, and which has been free from vegetation since. One had already commenced to spin its cocoon beneath the soil, which they continue to do, although wood has been put in the cage. The cocoon is made up of the grains of earth loosely united together with silk. Although the larvæ often leave the trees for a short time, I can find no records of them permanently taking up their abode for pupation in the ground.—F. V. THEOBALD; Wye Court, Wye, April 24th, 1896.

[Several instances are recorded of the pupation of the larva of this species either on or just below the surface of the ground. Sometimes it has been dug out of the earth.—ED.]

CAPTURES AND FIELD REPORTS.

ENDROMIS VERSICOLOR AT READING.—It is with great pleasure that I report a capture of this glorious insect, on April 18th, after some three or four hours' hard searching. I also found a couple of ova laid near the moth, and since have obtained a fair number from my captive. On the same day, and on the same ground, I saw single specimens of *E. versicolor* (male), and *Brephos parthenias*, but was unable to capture either of them. Two specimens of *Ematurga atomaria* also turned up (this I should imagine is abnormally early?).—C. J. NASH; Pitnacree, Culver Road, Reading.

VANESSA C-ALBUM IN SOUTH WALES.—While staying at Hay, Brecknockshire, this April, I took a hybernated male specimen, in good condition, of this insect, in Dany Forest, and a female specimen in Boatside Wood, on the banks of the Wye. I also saw another specimen in this wood, but was unable to capture it. Both insects were taken on dullish days, and were disturbed from the long herbage. On flying they soon settled on a tree-trunk, making their capture easy.—A. D. SIMMS; Birmingham, May 2nd, 1896.

PLUSIA FESTUCÆ: CONFLUENT SPOT FORM.—I have just received a specimen of *P. festucæ* in which the spots are confluent, from Mr. J. Collins, of Warrington.—J. ARKLE; 2, George Street, Chester, April 27th.

CUCULLIA VERBASCI AT REST.—On April 19th I took an example of this species at rest. This is the first time I have ever met with the perfect insect in a state of nature.—W. M. CHRISTY; Watergate, Emsworth, Hants.

NEW FOREST, SPRING 1896.—I had four days' collecting at Easter in the New Forest, with two of my brothers. The weather was very favourable, and in the day time, by searching the trunks and palings, we secured the following insects:—*Trachea piniperda*, *Xylocampa lithorhiza* (very common), *Xylina rhizolitha* (two), *Tephrosia biundularia* (plentiful), *Larentia multistrigaria*, *Hybernia progemma*, *Eupithecia abbreviata*. *Brephos parthenias* was only occasionally seen, but *Gonopteryx rhamni* was very much in evidence. The sallows were almost over, but yielded a good series of *Taniocampa miniosa* and *Trachea piniperda*. We also took a few *Taniocampa munda*, *Lobophora lobulata*, *Anticlea badiata*, and single specimens of *Oporina croceago*, *Noctua plecta* (surely an unusual visitor to the swallow bloom), *Cidaria miata*, and *Taniocampa populeti*. A few larvæ of *Epunda lichenea*, *Cleora glabraria*, and *Ellopiæ fasciaria* fell to the beating-stick.—C. M. WELLS; Hurstfield, The Avenue, Gipsy Hill, April 26th, 1896.

BUTTERFLIES IN THE CHESTER DISTRICT.—*Pieris brassicæ*, scarce during 1894 and 1895. I saw only one female last season, and three or four males. *Vanessa urticæ*, undoubtedly abundant in 1895. *V. atalanta*, scarce; I saw only two specimens. *V. io*, much less observed than in 1894. *Polyommatus phlæas*, unusually abundant in places like Beeston Castle hill: specimens with row of blue spots, from two to four, on hind wings and parallel with inner margin of red band, common. *Cenonympha pamphilus*, common, as usual; I took, in North Wales, a male of this species with the usual dark borders to all wings, large black apical spot on each fore wing,

and two small black spots on each hind wing parallel with the inner margin of the dark border.—J. ARKLE; Chester.

MACRO-HETEROCERA IN THE GUILDFORD DISTRICT (concluded from page 134).—GEOMETRÆ.—**Uropteryx sambucaria*. Common. A large number bred in 1895, from a batch of ova laid by a crippled female in July, 1894. It seems very easy to get the larvæ of this species through the winter without loss; the mortality during and after hibernation was very small. Perhaps the evergreen nature of its common food-plant (ivy) may have not a little to do with it.—**Rumia luteolata*. Abundant everywhere.—**Venilia macularia*. Common in most of the woods.—**Metrocampa margaritaria*. One taken July 2nd, 1887.—**Selenia bilunaria*. A few of both broods taken.—**Odontopera bidentata*. Fairly common. A large number bred in 1893. These last are rather variable, and all somewhat small.—**Crocallis elinguaris*. Two in Aug., 1894.—**Eugonia alniaria*. Two or three in 1886.—**E. quercinaria*. Two in 1886.—**Himera pennaria*. A few.—**Amphidasys strataria*. One larva, June 13th, 1892. Imago emerged March 26th, 1893.—**A. betularia*. Fairly common.—**Hemero-phila abruptaria*. Common.—**Boarmia repandata*. A few.—**B. gemmaria*. Common in most years.—**Tephrosia crepuscularia*. A few seen, May, 1894. I was unable to visit the locality in 1895.—**Geometra papilionaria*. One, June 10th, 1889. I have also seen others which have been taken in the district.—**G. vernaria*. A few. Common ten years ago.—**Iodis lactearia*. A few.—**Asthena candidata*. Very common.—**Acidalia bisetata*. Fairly common.—**A. virgularia*. Very common everywhere.—**A. subsericeata*, **A. remutaria*, **A. imitaria*. A few specimens of each.—**A. aversata*. Very common; both varieties taken.—**Cabera pusaria*. Very common.—**Bapta temerata*. Fairly common.—**B. bimaculata*. One, May 12th, 1894.—**Halia vaularia*. Fairly common.—**Strenia clathrata*. Abundant.—**Panagra petriaria*. Very common.—**Numeria pulveraria*. A few taken; also a few bred in May, 1892.—**Ematurga atomaria*. Common.—**Bupalus piniaria*. A large number seen in July, 1892.—**Abraxas grossulariata*. Abundant, but less so than usual last year (1885).—**Ligdia adustata*. Very common.—**Lomaspilis marginata*. A few.—**Hybernia rupicapraris*. Very common; also larvæ.—**H. leucophæaria*. A few seen in 1895.—**H. aurantiaria*. A few bred, November, 1894, from larvæ found in May.—**H. marginaria*. Very common. Some of the males are more or less suffused with smoky black.—**H. defoliaria*. Common and exceedingly variable. A male taken in February, 1886. Larvæ abundant.—**Anisopteryx æscularia*. Fairly common.—**Cheimatobia brumata*. Very abundant. Larvæ very destructive.—**Oporabia dilutata*. Fairly common.—**Larentia didymata*. Common. *L. viridaria*. Fairly common.—**Emmelesia affinitata*. One, April 20th, 1893.—**E. decolorata*. Fairly common.—**Eupithecia venosata*. A few.—**E. pulchellata*. Larvæ fairly common. **E. oblongata*, **E. vulgata*, **E. coronata*. Common.—**Thera simulata*. A single specimen.—**Hypsipetes sordidata*. Common.—**Melanthia ocellata*. Fairly common.—**Melanippe procellata*. Fairly common. *M. unangulata*, **M. rivata*, **M. montanata*, **M. fluctuata*. All common.—**Anticlea badiata*. Fairly common.—**A. nigrofasciaria*. A few.—**Coremia ferrugata*. Common.—**Campptogramma bilineata*. Very abundant; in hundreds everywhere.—**Phibalapteryx tersata*. Fairly common.—**P. vitalbata*. Common.—**Triphosa dubitata*. Fairly common.—**Scotosia rhamnata*. A few, but several years ago.

—**Cidaria miata*. A few seen in most years.—**C. corylata*. A few.—**C. truncata*. Fairly common.—**C. suffumata*. A few.—**C. prunata*. A single specimen.—**C. fulvata*. A few.—**C. dotata*. Fairly common.—*Eubolia limitata*, *E. plumbaria*. A few of each.—**E. bipunctaria*. Common on the chalk.—*Anaitis plagiata*. Fairly common.

I can say but little in reference to the local variation exhibited, as the material at hand (in very many cases only two or three odd specimens) is very limited. The foregoing list of 211 species can only represent a small portion (in all probability much less than half) of the total number to be found in the district. Although it includes but few species that are either local or rare, there is not the least doubt that many rarities would reward an energetic collector with plenty of the ever-needed time at his disposal, which last, however, I fear, must be counted among the desiderata of most entomologists. There are, most likely, numerous records to be found in the very voluminous literature of past years to which I have not access; but *Xylina zinckenii* (Newman, 'British Moths,' p. 428), and *Plusia moneta* (Entom. xxiv. 194; xxvii. 246), are enough to show that species of considerable rarity and interest (apart from the mere collector's point of view) have been, and are, taken in the district so imperfectly covered by this article.—W. GROVER; Guildford, Nov. 1895.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*May 6th, 1896.*—Professor Raphael Meldola, F.R.S., President, in the chair. Mr. Percy Evans Freke, of Step House, Borris, Co. Carlow, Ireland, was elected a Fellow of the Society. Mr. Champion exhibited specimens of *Amara famelica*, Zimm., from Woking, Surrey, a recent addition to the British list. He also exhibited, on behalf of Mr. Dolby-Tyler, a series of *Eburia quadrinotata*, Latr., from Guayaquil, Ecuador, showing variation in the number of the raised ivory-white lines on the elytra, there being sometimes an additional mark exterior to the short basal line, and sometimes an additional one on the inner side of the second line. Mr. Gahan said he did not notice anything remarkable in the specimens, except in the arrangement of the spots. Mr. Horace Donisthorpe exhibited a specimen of *Pterostichus gracilis*, with three tarsi on one leg, taken near Weymouth last month. Mr. G. T. Porritt exhibited a series of *Arctia menthastri* which he had just bred from Morayshire ova; the ground colour of the specimens varied from the usual white, through shades of yellow, and dark smoky-brown. Mr. Merrifield exhibited specimens of *Gonepteryx rhamni*, bred from larvæ found in North Italy and Germany, the pupæ of which had been subjected to various temperatures. He said that high temperature appeared to cause an increase of yellow scales in the female, and low temperatures generally reduced the size of the orange discal spot on the fore wings of both sexes. He also exhibited some bred specimens of species of *Vanessa*, the result of experiments tried with a view to ascertain the extreme of high temperature that the pupæ would bear, and its results. The species exhibited included *Vanessa atalanta*, *V. urticae*, and *V. antiopa*. Mr. Merrifield said that the effects on the

imago produced by temperature were being made the subject of systematic research by Professor Weismann, Dr. Standfuss, Mr. E. Fischer, and others. Mr. Elwes asked if these experiments had been made on pupæ only, or on the larvæ as well. Mr. Merrifield said that the results were only noticeable when the experiments were made on pupæ. The effect of them on larvæ was not apparent. Mr. Kirkaldy exhibited and made remarks on ova of *Notonecta glauca* var. *furcata*. Mr. Tutt exhibited living larvæ of *Apamea ophiogramma*, together with the grass on which it was feeding. He said the species was formerly considered rare in Britain, but was now found freely in any localities where ribbon-grass (*Digraphis arundinacea*) was plentiful. The Secretary read a communication from Mr. E. Meyrick on the subject of Professor Radcliffe-Grote's criticisms, contained in his paper published in the 'Proceedings' of the Society, 1896, pp. x-xv, on the use of certain generic terms by Mr. Meyrick in writing on the group of Lepidoptera known as the Geometridæ. Mr. Meyrick stated that he rejected the main assumption on which the criticisms were based. Mr. McLachlan opened a "Discussion as to the best means of preventing the extinction of certain British Butterflies." He referred to the extinction of *Chrysophanus dispar*, *Lycæna acis*, and *Aporia cratægi*, and to the probable extinction, in the near future, of *Papilio machaon*, and more especially of *Melitæa cinxia* and *Lycæna arion*. He stated that one of the objects he had in view in bringing this matter forward was to see whether some plan could not be devised to protect those narrowly localised species which were apparently in danger of being exterminated by over-collecting. Professor Meldola said he fully sympathised with the remarks of Mr. McLachlan, and he thought that a resolution passed by the Society, possibly in conjunction with kindred Societies, might produce some effect. Mr. Goss stated that *P. machaon*, although apparently doomed to extinction in its chief locality in Cambridgeshire (Wicken Fen), would probably linger on in the county in smaller fens, such as Chippenham, where the larvæ had been found feeding on *Angelica sylvestris*. It would certainly survive in the Norfolk Broads, both from the irreclaimable nature of the fens there, and the extensive range of the species in the district, which Mr. Goss said he had explored in 1887 in boats. He stated that *Melitæa cinxia*, although gradually disappearing from most of its old localities in the south of the Isle of Wight, was still found in the island further west in localities in which he had seen it in some numbers in May, 1895. He added that *L. arion* was far from extinct in Gloucestershire, and was distributed over a much wider area in the extreme south-west of England than was generally supposed. Its disappearance from South Devon was due to the burning of the grass, and the consequent destruction of the food-plant. Mr. Elwes stated that in the district in which he lived, in Gloucestershire, he had found *L. arion* in three or four places on his own property some ten or twelve miles distant from its known localities, but the species had disappeared of late years. The fact that *L. arion* had disappeared from his own property, where it was not collected, seemed to point to the fact that it was dying out from natural causes, perhaps owing to changes in climate. Colonel Irby said that *L. arion* had disappeared many years ago, not only from Barnwell Wold, Northamptonshire, but from another part of the county

on the estate of Lord Lilford, not accessible to the public, and that its disappearance there was no doubt caused by the destruction of the food-plant and other herbage, by burning the pasture and by the grazing of sheep. Mr. Crowley, Mr. Tutt, Mr. Waterhouse, and Mr. Blandford continued the discussion. It was moved by Mr. Tutt, and seconded by Mr. Elwes, that a committee be appointed by the Council to investigate the matter, and to report thereon. This was carried *nem. con.* Mr. Guy A. K. Marshall communicated a paper entitled "Notes on Seasonal Dimorphism in South African Rhopalocera." Mr. P. Cameron communicated a paper entitled "Descriptions of new species of Hymenoptera from the Oriental Region."—H. Goss, *Hon. Secretary.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*April 23rd.* T. W. Hall, Esq., Vice-President, in the chair. Mr. C. A. Briggs exhibited a male specimen of *Stylops melitta*, taken at Leatherhead on April 18th. Messrs. Barrett and Turner, series of *Triphæna comes (orbona)* from various localities. Mr. Adkin, his very long and varied series of the same species from many localities in the British Islands, and also specimens from Asia Minor and Europe. He then read a paper entitled "Further notes on *Triphæna comes*, with special reference to var. *curtisii*." After referring to his previous paper on the subject, he discussed at length the geographical distribution and variation of the species. Its range was from Syria in the east to the Atlantic coast on the west, and from S. Sweden and the neighbourhood of Moscow in the north to the southern shores of the Mediterranean on the south. Great Britain was its extreme N.W. limit, and here occurred the greatest variation. In Asia Minor the specimens were of a uniform clay-colour, the increase in intensity both of colour and markings being very gradual up to its extreme N.W. limit in the Orkneys, where the prevailing form was the var. *curtisii*. In Scotland the forms of variations were endless. The specimens from Scilly had scalloped transverse lines very plainly marked. He then discussed the history and distribution of the var. *curtisii*, and gave as the results of his experiments in breeding, that the species was, normally in its southern localities, continuous brooded, but in its northern limits had acquired the habit of hibernating in its larval stage. The extreme colour of var. *curtisii* may have been developed for protection, but further observations were necessary on this point. In the discussion which ensued Mr. Barrett said that the scalloped appearance of the second line was due to the coalescence of a row of dots with the slight projections of the waved line, and referred to the habit of the species of hiding under leaves, thus requiring little protective resemblance. Mr. Tutt had observed the scalloped second line in many *Noctuina*, and especially so in some specimens of *Nonagria lutosa* taken by Mr. Burrows. It was, he said, well known that the neighbourhood of the Moray Firth was very mild, and that its insect fauna was very like the southern forms. For protective purposes ataval forms were often returned to by insects. At Deal the species settled on the bare sand. Lately he had looked up the synonymy of the species, and was of opinion that the name ought not to have been changed from *orbona*. Mr. McArthur said that var. *curtisii* was undoubtedly protected. In the north it settled on the bare peat and among scattered heath, and

was then invariably dark. Where the ground was not all dark, there he found typical forms as well as the dark one.—HY. J. TURNER, *Hon. Report Secretary*.

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—Mr. G. H. Kenrick in the chair. Exhibits:—By Mr. A. H. Martineau, a willow-gall with the pupa-case of a *Cecidomyia* projecting from it; he described the manner of exit from the gall of the pupa. By Mr. P. W. Abbott, a fine series of *Spilosoma lubricipeda*, with its varieties, including *radiata* and *semi-fasciata*; the latter bred by Mr. Porritt, and the former by Mr. Mera. He also showed *S. menthastri* var. *ochracea* from Forres. By Mr. R. C. Bradley, a series of a curious little fly, *Pelomyza baumhaueri*, Loew, which he had found not uncommonly in one spot in Sutton Park last year. By Mr. Valentine Smith, a lot of Coleoptera, including *Amara patricia*, from near Stourbridge; *Donacia affinis*, from Kingswood; *Silpha quadripunctata*, from Sutton; *Rhopalomesites tardii*, from Lynmouth; *Calathus piceus* and *Ocypus pedator*, from Ilfracombe; and *Staphylinus erythrocephalus* and *Trox sabulosus*, from Cannock Chase. By Mr. W. Harrison, living pupæ of *Euchloë cardamines* from his garden at Harborne. By Mr. H. Foster Newey, a number of drawings in black and white of the larvæ and pupæ of British Lepidoptera, executed by himself and Mr. Rollason. They were very greatly admired for their detailed accuracy.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

OBITUARY.

MR. JOHN ANDERSON COOPER, whose death we briefly announced in our last issue, had attained his forty-seventh year. He was born at Thorpe, in the county of Durham, in 1849. Mr. Cooper was manager of the Leytonstone branch of Nevill's Bakery at the time of his decease, and had held that position for a period of ten or twelve years. Although his business life was an extremely active one, he still found time to devote to Natural History, in which he was greatly interested. The fine collections he formed of birds and their nests and eggs, as well as of Lepidoptera,* testify to the large amount of energy he put into the work, and the careful and painstaking manner in which he performed it. As a collector of Lepidoptera he had few equals, and it was always his ambition to make himself practically acquainted with the habits, and if possible with the life-histories, of the species he added to his collection. His knowledge, indeed, in these particulars was considerable; but although he was at all times most happy to give information to those who sought it of him, he could rarely be induced to publish anything concerning his entomological or other natural history work. He was elected a member of the South London Entomological and Natural History Society in 1884. His genial disposition and straightforwardness of character secured him many friends, by all of whom his loss will be sincerely deplored.

* We understand that the entomological collection will be sent in to Stevens's at an early date.

EXCHANGE.

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Duplicates.—Ova and imagos of Zonaria. Almost any offers accepted.—James Grime; 243, Halliwell Road, Bolton.

Duplicates.—Quercus, pupæ (100). *Desiderata.*—Numerous.—J. T. Hyde; The Grove, Portland.

Duplicates.—Haworthii, Graminis, Bicolorata, Chi; larvæ of Opima, Chi; pupæ of Festuæ. *Desiderata.*—Numerous.—J. E. R. Allen; Portora, Enniskillen, Ireland.

Duplicates.—Larvæ of Lanestris. *Desiderata.*—Other larvæ; not Dispar, Zonaria, or Defoliaria.—Rev. C. F. Thornewill; Calverhall Vicarage, Whitchurch, Salop.

Duplicates.—Lunaria,* Piniperda,* Opima,* &c. *Desiderata.*—Sambucata,* Advenaria,* Maculata,* Prunaria,* Tiliaria,* &c.—W. Renton; Deanbrae Cottage, Hawick, N.B.

Duplicates.—Clivina fossor, Hydroporus planus, Ocypus ater, O. compressus, Aphodius pusillus, Oxyomus porcatus, Onthophagus fracticornis, Chysomela hyperici. *Desiderata.*—Very numerous.—A. S. Carr; The Hill, Wheathampstead, Herts.

Desiderata.—Larvæ and pupæ for illustrated new work: Polycommata, Tiliaria, Bipuncta, Curtula, Furva, Abjecta, Chamomillæ, Lobulata, Exulis, Luctuosa, Flavocincta, Syringaria, Lutosa, Carnica, Aprilina, Craccæ, Plumigera, Cassinea, Nubeculosa, Suspecta, Anachoreta, Certata, Carmelita, Flavicornis, Diffinis, W-Album, Betulæ, Corydon, Semele, Aglaia, Adippe, Actæon, Medea, Lathonia.—W. A. Rollason; 1, Newhall Street, Birmingham.

MEETINGS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—Wednesday, June 3rd, at 8 p.m. Paper to be read:—"On the Phylogeny and Evolution of the Lepidoptera from a pupal and oval standpoint," by Dr. Thomas Algernon Chapman, F.E.S.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.—Meetings on the 2nd and 4th Thursdays in each month, at 8 p.m.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—The meetings of this Society (held at the London Institution, Finsbury Circus, E.C.) will take place on the 1st and 3rd Tuesdays in each month, from 7.30 to 10 p.m. as heretofore.

NORTH LONDON NATURAL HISTORY SOCIETY.—Meetings are held on the 2nd and 4th Thursdays in each month at the North East London Institute, Dalston Lane (close to Hackney Downs Station on the G.E.R.), from 7.45 to 9.30 or 10 p.m.

TO CONTRIBUTORS.—Papers, Notes, and Communications, on all branches of Entomology, are solicited. Contributors are requested to conform, as far as possible, to the following rules:—All Communications must be *clearly* written on one side only of the paper. Generic names must be given in full, excepting where immediately before used. The Editor is not responsible for unused MS., neither can he undertake to return it, unless especially asked to do so. Contributors of the more important articles receive six copies of such articles. NOTICES of EXCHANGE (inserted without charge) must contain nothing more than the specific names of the duplicates and desiderata, except when two insects are known by the same specific name, and must be *clearly* written on one side only of the paper. All notes, papers, books for review, &c., and notices of exchange should be sent to the Editor,

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[No. 398.]

MR. STURT'S FORCING APPARATUS.

THE idea of this invention was suggested to Mr. Sturt by the modern seed-incubators. It is a great improvement on that of my friend the late Dr. Boswell Boswell (better known as Prof. Syme). Its principle, which I here publish with Mr. Sturt's permission, and indeed at his wish, appears, though simple, to be as excellent in conception as I am assured it is effective in practice. Mr. Sturt kindly went to the trouble of bringing up from Kingston one of his glass flower-pots, together with an explanatory sketch and notes, and also two lovely, but small, varieties of *Sphinx convolvuli*, the result of forcing; and left them with Mr. Cooke, of Museum Street, for my inspection and information. He has since obligingly furnished me with further details on points upon which I desired to be enlightened.

The annexed figure will show the arrangement of the components of this forcing-cage:—

A represents a hot-water soup-plate.

B a glass flower-pot inverted.

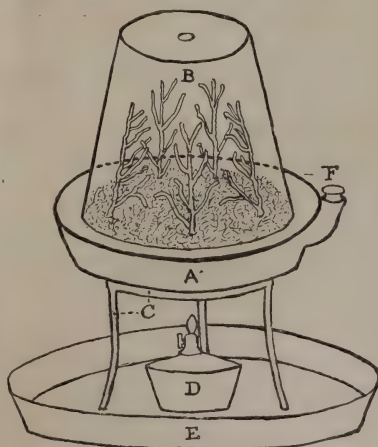
C a stout wire tripod stand, similar to those used for baking meat.

D a small paraffin-lamp to burn at least twenty-four hours.

E a tin tray.

If the soup-plate A be thought to be too costly, your readers will easily, if necessary, improvise a substitute by placing an ordinary soup-plate upon a shallow tin pan; and, similarly, if a difficulty is found in obtaining

the glass flower-pots, a bell-glass will answer the purpose, but it should be tilted in such a manner as to admit air below, for



Mr. Sturt considers that ventilation is important. The top of the flame of the lamp D should be about two and quarter inches from the bottom of the plate, for which purpose the height of the tripod stand should be regulated accordingly. Night lights may be used in the place of the lamp, but require more frequent attention.

In preparing the apparatus for use the sunken part of the soup-plate should be packed to the rim as tightly as possible with thoroughly damped moss; into this twigs, as shown in the figure, should be fixed, up which the insects, as they emerge, can crawl in order to expand their wings; the pupæ should then be arranged on the damp moss, and lightly covered with a thin layer of damp moss; they soon make hollows for themselves on the surface of the moss, and not unfrequently "kick off the blankets," seeming to prefer to lie bare. The metal compartment beneath the plate should now be filled through the opening F with water at about 100° F., the lamp lighted, and the whole placed away from all draught, which might extinguish the flame.

The temperature should be maintained between 90° and 110° F., but dampness should not be excessive, for Mr. S. believes that this is one of the chief causes of crippling; and he therefore contents himself with pouring only a few teaspoonfuls of water round the rim of the plate when he observes the moss becoming dry at the edges. The time occupied by the process of forcing is, in the case of *S. convolvuli*, from eighteen to twenty days. Insects should, of course, not be removed from the twigs until their wings are fully expanded.

The great use of forcing comes into play with the thin-skinned hawk-moths, and it is very interesting to watch the successive changes which take place in them. It does not answer well for the more pachydermatous pupæ, and often has disastrous effects upon such as are enclosed in tough cocoons.

H. GUARD KNAGGS.

London, June, 1896.

NEW EXPERIMENTS ON THE SEASONAL DIMORPHISM OF LEPIDOPTERA.

By DR. AUGUST WEISMANN.

(Translated from the German by W. E. NICHOLSON, F.E.S.)

(Continued from p. 185.)

A closer observation shows that, even with natural climatic varieties, it is not everywhere wholly a question of the direct influence of the colour-chemistry. The southern var. *ichnusa* of *Vanessa urticæ* always has less black above in so far as spots 5 and 6 are lost, spot 4 is at least smaller, and so is the black of

the hind wings; but the spots 1, 2, and 3 of the costa have not become smaller. Now, if the black of the costa behaves differently from that on the basal part of the wing, another factor must co-operate here, as I have already maintained elsewhere, and sought to explain theoretically. This can only be, as it appears to me, the influence which the previous history can exert on any particular part of the wing according to circumstances. If for a particular spot every kind of the otherwise similar ancestral determinants of the stem form were conveyed into the germ-plasm, then the normal colouring can be considerably interfered with by the action of an unusual temperature and the way cleared for a reversion to an ancestral form or to a mixed form.

The polar variety of *V. urticæ* also shows that with natural varieties other factors co-operate besides mere climatic influences. The specimens of this species from Lapland are clearly distinguished from the German specimens, but still the difference does not lie in an important alteration of the marking. Several specimens, however, of *Vanessa urticæ* from the northern island of Japan (Yezo) are known to me through the kindness of Dr. Fritze, which possess a black transverse band in lieu of the spots II. and 8; the space between these spots, with the Lapland *polaris*, is only somewhat flushed with black; here a broad deep black bridge is formed between both spots, similarly as with the Californian *Vanessa milbertii*. And this variety lives on the 43rd to the 45th parallel of north latitude. Can this then be a direct result of the climate, which is not very different from that of Southern Germany? Or must not something else, perhaps sexual selection, have co-operated with it? Is it a primitive form from which the var. *polaris* from Siberia and Lapland has been formed by the loss of the bridge between spot II. and 8? or is it the other way about, and is *polaris* striving after this var. *yezoensis* by gradual increase of the blackish shading between II. and 8? These are questions, which it is easier to ask than to answer, but which enable us to recognise how cautious we should be in the assumption of a reaction purely of temperature in a particular case.

Among the species experimented upon by me, *Pararge egeria* and *meione* present a third case of *direct alteration* by climate. With this species, as with *Vanessa urticæ*, it is nowhere a question of seasonal dimorphism, although the species produces two broods, wherever it occurs. This is simply explained by the fact that it is not the pupæ but the larvæ of the winter brood which hibernate; the pupæ, therefore, are not formed until the temperature has already become almost summer-like. Now, as the temperature which acts on the larvæ does not influence the perfect insect in colour or marking, and the conditions of temperature, which affect the pupæ of both broods, are not very

different, the conditions for the development of direct seasonal dimorphism are not given, as is also the case with *V. urticae*.

Merrifield also has recently made experiments with *Pararge egeria*, and I should very much like to be able to compare his results with my own. Apparently they contradict one another, in so far as my German brood of *egeria* were not altered by 32° C., while his pupæ, under the same treatment, produced butterflies with smaller and less sharply defined bright spots, and also with a considerably lighter ground colour.

With all respect for the great accuracy with which Merrifield obviously works and observes, I might yet suspect that the differences, which he here observes, are not far-reaching ones, but small individual variations, which are not connected with the increased temperature. I myself at first thought I saw constant differences between those specimens which were forced in the incubator and those developed at a room temperature, but, after a careful comparison of all my specimens, I saw my mistake. It would also contradict what we should expect, if our *egeria* had smaller spots from heat, as *meione* has them larger. For the rest, it is interesting to be able to confirm my earlier conjecture, that *meione* is the primary and *egeria* the secondary form, in the markings of the butterfly itself. *P. meione* has, indeed, more numerous and larger spots; thus, for example, there are five on the costa, while often only two are distinct in *egeria*. But two or three of the others may be generally recognised in *egeria* as faint indications of bright places, in the dark ground colour: "obsolete" (verloschene) spots, as the good and descriptive expression of the lepidopterists has it, which may be taken literally in this case, as these traces can only be explained as vestiges of the spots of the parent form.

Adaptive seasonal dimorphism.—I recently cited, by way of conjecture, the North American butterfly, *Lycæna pseudargiolus*, as an example of such among larvæ, when I was relying on the very detailed statements of W. H. Edwards. He found differently coloured larvæ in the summer and autumn broods of this butterfly. Now the earlier larva is white, and, as Edwards expressly says, well adapted to the white flower-buds of its food-plant, *Cimicifuga racemosa*; but the autumn brood is yellowish green or olive-green, and lives on a plant with yellow flowers, which blooms much later—*Actinomeris squarrosa*; so it is a question of assuming this latter colouring also to be protective, and of regarding the whole as a case in which the two broods have adapted their colouring to their different food-plants. American entomologists must prove whether this is actually the case. If it is so, then it would be a typical instance of adaptive seasonal dimorphism, inasmuch as the protective significance of both forms is without question. With the tropical butterflies having double seasonal forms, above referred to, it would also certainly

be the case, that *both* forms will have protective significance ; but it is not so easy to prove, on account of the uncertainty in estimating the biological value of many of the details of markings which here come into consideration, and at all events observations are required on the spot.

I have cited *Vanessa prorsa-levana* as a hypothetic example of an adaptive seasonal dimorphism of the perfect insect, and I have relied on the remarkable similarity which the upper side of the *prorsa*-form, with its black provided with a white band, has to *Limenitis sibylla* and *camilla*. But I do not ignore the difficulties which stand in the way of a proof that this is a case of mimicry. We do not yet know whether these species of *Limenitis* enjoy an immunity, or whether they are sought after by birds, or were sought after at an earlier period. But if it could be proved that they are privileged, and that *prorsa* obtained protection by its similarity to them, it still has to be explained, how the *levana*-form has an adaptive value, and, indeed, on its upper side, which generally possesses no adaptive value among the butterflies. To be sure, I was able to show years ago, that the dark upper side of the female blues actually conferred protection, as they lay their eggs with outspread wings, and are then considerably less conspicuous than the blue males are, when they sit with outspread wings. But we do not know the habits of the *levana*-form sufficiently accurately, and if we did know them, it would still be always sufficiently uncertain whether we could regard the undoubted similarity of the upper surface to the dead leaves of the spring wood as protective.

But, as it appears to me, we cannot well conceive that seasonal dimorphism can arise, unless *both* seasonal forms have an adaptive value. Granted the *one* alone is adaptive (here, for example, the mimetic *prorsa*-form), it would therefore be conceived as arising by selection, *i.e.* the determinants (*anlagen*)* of their wing-colouring would have been changed little by little from the *levana*-determinants to the *prorsa*-determinants. Now if, as my theory of heredity assumes, many primary constituents of the entire individual (the "ids") are present close to one another in each germ, then, although their selection need not necessarily follow the same course, one cannot see what should prevent the collective ids, little by little in the course of generations, from containing only *prorsa*-determinants, and from the *levana*-determinants being supplanted. Now generally, if the *prorsa*-form has an advantage over the *levana*-form even only in the summer, all individuals which are not true *prorsa*

* *Anlagen* is here used as synonymous with determinant. In reference to the difficulty attending the proper rendering of *anlagen* in its various meanings, *cf.* Prof. Parker's note to his translation of the 'Germ-Plasm' (Cont. Science Series). He frequently renders it "primary constituent." Later on Prof. Weismann uses it as synonymous with "id."—Translator.

will have to be rejected by degrees. These specimens, however, are just those which still contain *levana*-determinants, and in which both of the characters are mixed. In this case, therefore, the *levana*-form must wholly disappear, and both broods become similar.

Only if the *levana* colouring were more advantageous in the spring than the *prorsa* colouring, it could and *must* remain, and, indeed, from the fact that only a part of the id contained in the germ-plasm was altered, while another part remained unaltered. There cannot well be any doubt but that *levana* is the original form, as, according to Trybom's observations, it is at the present time the only form in those places where only one brood occurs in the year, as in Siberia on the Yenesei.

But if it is not at present possible to bring forward a proof that the upper sides of *prorsa* and *levana* are to be regarded as protective colouring, yet the delicate combination and generally the kind of variability of both patterns of colour are decisively against their interpretation as direct climatic forms.

Already, in my work on seasonal dimorphism of the year 1875,* I laid stress upon the fact, that the *prorsa*-form could in no way be simply referred to an increase of the black. I there said (page 40):—"Even in the case of species the summer form of which really possesses far more black than the winter form, as, for instance, *Vanessa levana*, one type cannot be derived from the other simply by the expansion of the black spots present, since on the same place where in *levana* a black band runs" (across the hind wings), "*prorsa*, which otherwise possesses much more black, has a white line. The intermediate forms which have been artificially produced by the action of cold on the summer generation present a graduated series, according as reversion is more or less complete; a black spot first appearing in the middle of the white band of *prorsa*, and then becoming enlarged until, finally, in the perfect *levana*, it unites with another black triangle proceeding from the front of the band, and thus becomes fused into a black bar. The white band of *prorsa* and the black band of *levana* by no means correspond in position; in *prorsa* quite a new pattern appears, which does not originate by a simple colour replacement of the *levana* markings."

This is perfectly accurate, although later on a fanatic opponent of the evolutionary doctrine simply described it as "false," and as a "want of observation."† The different stages of the conversion of the *levana*- into the *prorsa*-marking can be followed to some extent in the different forms of *porima*, and it is certainly

* Weismann, "Studien zur Descendenztheorie. I. Ueber den Saison Dimorphismus der Schmetterlinge." Leipzig, 1875.

† Johannes Schilde, "Gegen pseudodoxische Transmutationslehren, ein Entomolog." Leipzig, 1879.

very instructive to see that this does not in any way follow fixed principles, but is in a certain sense without rule. It cannot be said: the black increases, the yellow changes into white, but "in this place the black expands, there it is changed into white," as was shown above; the white band of the hind wings originates from black in its lower part, from brownish yellow in its upper part; the interrupted band of white spots originates, on the other hand, only out of the brownish yellow ground colour. Many of these changes, therefore, cannot possibly be simply chemical processes, induced by the action of a higher temperature on the "pigment-formers" (Pigmentbildner) of the wings of the pupa, and comparable to the reddening of blue litmus-paper in acids. All that I wrote on the subject twenty years ago I still consider fully justified: "A new marking has developed, emanating from the existing one." But while I then thought that this new formation must be always regarded as a reaction of the specific *levana*-organism to a higher temperature, I now recognise that temperature does not in general take part here as the actual cause, but that it is a question of a process of selection, which goes on independently of the temperature, and which gradually alters (umstempelte) some of the *ids* to the *prorsa*-*ids*. But these *prorsa*-*ids* were at the same time so arranged that they become active under the action of a higher temperature, if this is acting at the beginning of the pupal period, while the *levana*-*ids* become active at a lower temperature. Heat, therefore, is only the *excitant which sets free* the *prorsa*-determinants, while cold sets free the *levana*-determinants.

But this does not exhaust the matter. As already explained above, I formerly thought that the offspring of the *prorsa* brood always assumed the *levana*-form, even if their pupæ were subjected to a high temperature: this was not, indeed, entirely correct, but still it contained a germ of truth, so far as this second brood has a *stronger tendency* to the *levana*- than to the *prorsa*-form. This is convincingly proved by all the experiments. They *can* be changed into *prorsa*, as one of my old experiments of 1869 proves, in which the whole brood of a female of *prorsa* again assumed the *prorsa*-form under the influence of the unusually hot July sun. But in this case also the tendency of this second brood to the activity of the *levana*-*ids* can be recognised from the fact that many butterflies exhibited a striking amount of yellow, and were, indeed, almost *porima*. On the other hand, the first brood of the year has just as pronounced a tendency to the activity of the *prorsa*-determinants, otherwise it must be possible to always make all individuals of a brood into *levana* by cold, which I, at least, have not succeeded in doing; but generally a not quite pure form of *levana* originates in this way, often only approaches to it, viz. *porima*. If this were not so, a number of *levana* butterflies would fly in July every cold

summer, a fact which has never yet been observed. But at the same cool temperature—say, 15° C.—at which the first brood would produce *prorsa* butterflies, the second produces exclusively *levana* butterflies, or at any rate a preponderance of them.

These facts, as it appears to me, force us to assume, *that an alternation of the two forms is provided by nature*, apart from the influences of temperature; that in the first brood the *prorsa*-ids, in the second, *i. e.* the first generation of butterflies of the following year, the *levana*-ids are predisposed to activity, and that they can only be prevented from actual activity by special outward influences. The most important of these influences is the temperature during the pupal period, which acts in such a way that many individuals of the first brood of the year can be induced by cold to assume the *levana*-, or at any rate the *porima*-, form, and almost a majority of the individuals of the second brood can be induced by heat to assume the *prorsa*-form. Apparently everything is arranged so that butterflies emerging in the summer possess the *prorsa*-form, and, indeed, although the summer is not hot, and that all butterflies emerging in the spring possess the *levana*-form, although the spring is quite warm, as is often the case with us. The experiments have shown, that all hibernating pupæ produce *levana* without exception, let them be subjected to ever so high a temperature.

It appears to me that by taking this view of seasonal dimorphism we obtain a more satisfactory insight into this remarkable phenomenon, than we hitherto possessed.

(To be continued.)

SILK-PRODUCING LEPIDOPTERA.

BY ALFRED WAILLY.

(Membre Lauréat de la Société Nationale d'Acclimatation de France).

(Continued from p. 159.)

WILD SILKWORMS.

Asiatic Species.

ANTHERÆA YAMA-MAI, Guérin Méneville (Japanese oak silkworm). This wild silkworm, reared on a large scale in Japan, on account of the beauty and excellent quality of its silk, was introduced into France in 1861, by Guérin Méneville. Bred in various parts of Europe with more or less success, it has now almost disappeared, breeders having lost it, or given it up, to rear an easier species, *Antheræa pernyi* (Chinese oak silkworm); but new attempts are being made to rear it again from eggs imported from Japan. That which discouraged most breeders was that the eggs generally hatched before the oak buds were suffi-

ciently developed; besides, the moths, for the most part, refused to pair in captivity. It would, however, be easy to deal successfully with these two drawbacks. I have already in former reports recommended the use of small oak trees in pots, to rear the worms till the oak buds are sufficiently developed. On the other hand, premature hatching of the worms may be avoided by placing the eggs, during the winter, in muslin bags suspended in the open air in a northern aspect and protected from the rays of the sun. As soon as the oak buds have burst open, the eggs may be submitted to a gentle and moist temperature, so that they should all hatch as rapidly as possible. With respect to the other difficulty, that of the pairing of the moths, the cages containing the latter should be placed in the open air, and even tied to branches of trees, when this is possible. In rooms the *yama-mai* moths pair with the greatest difficulty, and it is the same with many other species. Of course cages containing moths must be protected from would-be enemies.

Like the ova of *Bombyx mori*, *A. yama-mai* ova are naturally preserved all the winter, and hatch in the spring. But in reality there is a notable difference between the two species. The eggs of *B. mori* only contain a germ during the winter; they remain liquid. It is only in the spring, after the eggs have been submitted to the heat, that the larva is formed and hatches after it is fully developed. The fertile *yama-mai* ovum, on the contrary, contains a larva which is formed about three weeks after the laying, and this larva, fully developed in the month of August or September, remains in the ovum till March or April, and sometimes later, before hatching. Therefore *Bombyx mori* hibernates in the ovum state and *yama-mai* in the larval state.

Ova of the other silk-producing Bombyces which I have bred could never hibernate; they always hatched a few weeks after they were laid or the larvæ died in the egg, if the weather was too cold for them to hatch. The eggs of the second brood of *Antheræa pernyi* and *Attacus cynthia*, for instance, laid in October, were never of any use for the following spring, and it was the same respecting the eggs of *Antheræa mylitta*, *Attacus atlas*, and others.

Ova of the *yama-mai* in the southern parts of Europe may hatch in March; in central parts they hatch in April, in northern parts in May, and in Scotland in June. All depends on the temperature of the various countries; besides, the hatching of the eggs, like the emergence of the moths from the pupæ, may be retarded or accelerated by the variations of temperature, as is the case with our native Lepidoptera.

It is the same with respect to the duration of the rearing of the various species; no time can be specified, unless a uniform temperature can be obtained. Once, in London, in the open air, the duration of a rearing of *yama-mai* larvæ lasted one hundred and ten days; on the contrary, a rearing made in a conservatory,

at a temperature of 25° to 27° Centigrade, lasted only about one month.

ATTACUS CYNTHIA, Drury (Ailanthus silkworm). Introduced into France by Guérin Méneville in 1858, its cultivation spread through Europe, in parts of Africa and America, and even in Australia. This species, with an open cocoon like all those of the same genus, is naturalized in France and the United States of North America. Besides the Ailanthus (*Ailanthus glandulosa*), *Attacus cynthia* can be reared on the castor-oil plant (*Ricinus communis*), lilac, laburnum (*Cytisus laburnum*), barberry (*Berberis vulgaris*), cherry, &c.

Cynthia moths generally emerge about the end of June, and the eggs hatch, at the ordinary temperature, about a fortnight after they have been laid. In hot climates this species becomes bivoltine, and even polyvoltine. A native of China, *Attacus cynthia* is also found wild in India all along the Himalaya range, in Assam and other parts, where it feeds on various plants. The moths pair easily, and the larvæ are very easy to rear in the open air in England and other northern countries.

ANTHERÆA PERNYI, Guérin Méneville (Chinese oak silkworm). This valuable species, with a large closed cocoon of rich silk, is, with the preceding species, the easiest to rear in the open air in northern countries. The moths pair easily in captivity, and in any situation. The species is single-brooded in the northern parts of Europe, and double-brooded in the southern parts. In South Europe the moths may emerge from March, in central and northern parts from April and May; sometimes they will emerge in June. The rearing in the open air lasts from six to eight weeks, and sometimes longer.

Pernyi larvæ may be reared on plum and apple trees, but they do not thrive well on these, as far as my experience goes. One of my correspondents in Illinois, U.S.A., however, wrote to me, some years ago, that he saw his *pernyi* larvæ of the second generation leave oak trees, of which the foliage had become hard and tough through the great heat and drought, go and feed on hawthorn bushes; others were found in a garden on apple trees, where they had reached an enormous size.

(To be continued.)

ENEMIES OF HUMBLE-BEES IN NEW ZEALAND.

By W. W. SMITH.

AMONG the many animals introduced into New Zealand by the Canterbury Acclimatisation Society, the humble-bee may justly claim first honours in their order of merit. Since the ninety queens were liberated at Christchurch, N.Z., nine years

ago, the sum of about £200,000 has been realized on red clover (*Trifolium pratense*) seed alone. Their rapid establishment and phenomenal dispersion over the South Island are, I believe, well known to entomologists. In New Zealand, as in Europe, they are subject to fluctuations in the seasons, and to several enemies. Last winter (May to August) was perhaps the severest on record in the South Island. Snow two inches deep lay on the Canterbury plains for several days, while sharp frosts were experienced every night for a fortnight. Deeper snow and harder frosts were also experienced in nearly all the upland and alpine country. As a result the humble-bees were not so numerous during the present as in the two previous summers; nor have their labours been quite so beneficial in fertilizing the red clover. Good results may, possibly, follow an occasional severe winter in preserving and perpetuating hardier forms of the race.

Favourite and comfortable places for the humble-bees to hibernate in are the raised banks beneath gorse hedges, and the cavities about the roots of *Pinus insignis* growing on the plains. It is, however, more their enemies in New Zealand I now desire to refer to than to their general history. For two seasons we have found numbers of dead humble-bees with a small puncture either in their thorax or abdomen. On the 9th January of the present year I was fortunate in ascertaining the cause of these punctures, and in witnessing the death of a humble-bee. I was admiring a fine group of antirrhinums in bloom, on which several queens and neuters of *Bombus hortorum* var. *subterraneus* were working. Instantly a queen was seized by a large Dipteron (*Asilus varius*), both falling together to the ground. The *Asilus*, although inferior in size to the humble-bee, was able to hold it on the ground, to pierce the fore part of the thorax, and kill the bee in a few seconds by sucking out the viscera. In both America and Europe the carnivorous habits of the Asilidæ are well known, especially their destruction of hive-bees. They have likewise become troublesome about hives in this district every summer. Although my small entomological library contains no records of *Asilus* destroying humble-bees in Europe, I may suppose they do exist.

Another enemy of humble-bees here is the introduced English starling. Last nesting season we noticed them several times capturing and carrying the bees to their nests to feed their young. Excepting fragments of the bees' wings, we were unsuccessful in finding other portions of their bodies in the exuviae around the nests. In many of the agricultural and pastoral districts of New Zealand, the starling's services are invaluable as destroyers of injurious insects. It is, therefore, regrettable that these birds now attack the humble-bees. Up to the present I have not observed any of the native birds attacking them in this district.

Ashburton, N.Z., April, 1896.

[Mr. Edward Saunders (Ent. Mo. Mag. xxii. 94) records the occurrence of a number of dead or dying humble-bees on the ground under a lime tree in August, 1885. "Nearly every specimen appeared to have been killed in the same manner, having a large hole in the upper surface of the thorax, and another at the apex of the abdomen, the apical segments being removed." For some time he was unable to discover any clue to the possible cause of mutilation; but at length he noticed the carcass of a bee to fall from a branch of the tree upon which a bird, subsequently determined to be the great tom-tit, was disporting itself. The writer adds:—"Although I have no positive evidence whereby to convict *Parus major*, I think the probabilities of his being the culprit are so strong that it is hardly necessary to seek further for the murderer of these humble innocents."—ED.]

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. DE VISMES KANE, M.A., M.R.I.A., F.E.S.

(Continued from p. 162.)

CUCULLIA UMBRATICA, L.—Universally common, and variable in colour and markings. Var. *tanaceti*, Haw., seems to correspond with a large number of our males, and many of our females would rank as var. *lucifuga*, Haw. Var. *lactuceæ* is a not uncommon form also, of dark grey streaked with lighter; the hind wings brown, with a paler base.

GONOPTERA LIBATRIX, L.—Common in most localities.

HABROSTOLA TRIPARTITA, Hufn.—Widely distributed, but rarely numerous, so far as my experience goes. In most places more common than *H. triplasia*. Some examples have the ground colour dark brown, but in others it is almost black. The var. *urticæ*, Hb., which approximates the latter species in the suppression of pale markings, I have not met with. Localities:—Howth, &c., Co. Dublin; and in Co. Wicklow; Cromlyn (Mrs. B.) and Killynion (Miss R.), Co. Westmeath; Drumreask, Monaghan, rare; Favour Royal, Tyrone, rare; Sligo, rather abundant (R.); Coolmore, Co. Donegal (J.); about Derry, rather rare (C.); Carlingford and Castle Bellingham, Co. Louth (Thornhill); Enniskillen, rare; common near Belfast (W.); Clonbrock, common (R. E. D.), and at Ardrahan and elsewhere in Co. Galway.

HABROSTOLA TRIPLASIA, L.—Widely distributed, but somewhat scarce. Derry, abundant (C.); Castle Bellingham, Co. Louth, abundant (Thornhill); Belfast, abundant (W.); Carlingford and Armagh, scarce (J.); Coolmore, Co. Donegal, scarce

(*J.*); one at Galway (*A.*); Ardrahan (*Harker*); Clonbrock, two (*R.E.D.*); Sligo (*R.*); Markree Castle, a few; Tempo Manor (*Langham*); Drumreask, Co. Monaghan, a few; Cromlyn, Co. Westmeath (*Mrs. B.*); Kenmare, Co. Kerry, &c.

PLUSIA ILLUSTRIS, *Fab.*—A specimen of this rarity in good condition was netted flying to bramble-flowers at Castle Kevin, Annamoe, Co. Wicklow, in August, 1887, by Miss Alice Hull, daughter of Prof. Hull, F.G.S., who had taken the place during the summer of that year. She was unaware of her prize, which she gave to the National Museum, until Mr. Carpenter, F.E.S., identified it. The only British captures (in Wales, and by a Mr. Pratt on Salisbury Plain) took place previous to 1811, since which no further records are known. That the insect has not again been taken in Ireland proves nothing, considering the plentiful lack of Irish entomologists; and it may eventually prove to be indigenous, and not a stray visitant; as in more than one instance—such as *Plusia bractea* and *Dianthæcia cæsia*—species for many years known as Irish from single specimens, have proved to be plentiful when sought for. In France it inhabits the mountains of Dauphiné, the Hautes and Basses Alpes, the Pyrenees and Doubs (*Bruand*), and is not rare, the larvæ feeding on various species of Aconite, &c., like that of *P. moneta*. As the common monkshood is widely cultivated in cottage gardens, there is no difficulty (as has been proved in S.E. England in the case of the latter species) in regard to a supply of a suitable food-plant in Ireland.

PLUSIA CHRYSITIS, *L.*—Abundant in most places. The Linnean type has the two metallic-green areas separated by the unbroken median brown band (*Tutt's Brit. Noct.*). In Ireland, as in England, however, this is a rare aberration. In some specimens the metallic sheen is more blue than green, but I have some doubt if this is the case in really fresh specimens.

PLUSIA BRACTEA, *Fb.*—Very widely distributed, though apparently somewhat local. In suitable seasons it is abundant in some localities. The metallic blotch varies somewhat in shape, and in some instances inclines to a silvery tint. A second brood was noticed by Miss Reynell on Sept. 5th, 1893, at Killynon, Co. Westmeath, where, and at Cromlyn (*Mrs. B.*), it is generally plentiful. Trim, Co. Meath (*G.V.H.*); Cabra, Howth, and Dundrum (*Low*), Co. Dublin; Co. Wicklow (*B.*); Mullingar (*Wilcox*); Johnstown, Co. Kilkenny (*S.*); Glandore and Ballinadee, near Bandon (*D.*), Co. Cork; Cappagh, Co. Waterford (*Miss V.*); Kenmare, Co. Kerry; Lisdoonvarna, Co. Clare; and Killaloe, not rare; Westport, Co. Mayo (*W.*); Knocknarea, numerous (*R.*), and Markree Castle, Co. Sligo; Clonbrock, abundant (*R.E.D.*), and one at Galway (*A.*); not rare near the town of Donegal.

PLUSIA FESTUCEÆ, L.—Found in most localities, but seldom abundantly. The ground colour is sometimes a very deep brown, wholly obscuring the neuration in the central wing-area. The two metallic central patches are most variable in size and shape, sometimes very widely divided, and sometimes only by a line. I have taken it in the extreme north, as well as in Co. Cork, and it is widely spread throughout Central Ireland. A second flight has been often observed in September by myself and others.

PLUSIA IOTA, L.—Local, and by no means usually common. Mr. Maurice Fitzgibbon took a very pretty salmon-tinted specimen at Howth (? var. *ancora*, Frr.). The gamma-mark is sometimes very minute in var. *percontationis*, Tr., but I have never seen a specimen in which it was obsolete. Found widely in Cos. Dublin and Wicklow; Castle Bellingham, very numerous (*Thornhill*); Armagh (*J.*); near Derry (*C.*); scarce at Clonbrock, Co. Galway (*R. E. D.*); Sligo, and Drumreask, Co. Monaghan; not rare in Co. Westmeath.

PLUSIA PULCHRINA, Haw.—The commonest species except *P. gamma*. The ground colour varies from a rich yellowish brown to a fine purple, variable in strength of tone. Below the oval metallic spot is another of deep orange colour in most examples.

PLUSIA GAMMA, L.—Extremely common everywhere. Rarely fresh specimens occur with pale ground colour like that of hibernated examples. Some years ago I noticed this moth in swarms on the bare shaven sward of Dursey Island, off the Kerry coast, flying to the thrift flowers; and, as the locality is a very unlikely one for this species to breed in abundance, it would suggest a migration.

PLUSIA INTERROGATIONIS, L.—Common on many heathery moors and hillsides in Ireland. Our specimens seem to be somewhat brighter in ground colour than Scottish, which are blacker. When freshly emerged the violet-purple tint is very handsome. One specimen I took at Mote Park, Roscommon, is very pale in ground colour, with the transverse lines and markings very striking and broad, as well as the interrogation marking, which is extraordinarily large and massive. In some specimens, however, it becomes almost obsolete. The larvæ are conspicuous and easily found both by lamplight and in sunshine, but are very subject to ichneumons. Localities:—Altadiawan, Co. Tyrone, not rare; Tempo Manor, Enniskillen (*Langham*), do.; Cromlyn (*Mrs. B.*) and Killynon (*Miss R.*), Co. Westmeath, do.; Ballinasloe, very common (*Hon. Emily Lawless*), and Mote Park, Roscommon; Hollybrook (*Miss ff.*), Markree Castle, and L. Gill, abundant, Co. Sligo; Kilderry, near Derry, not rare (*C.*)

(To be continued.)

NOTES AND OBSERVATIONS.

"FUNGI PARASITIC ON BUTTERFLIES."—In reference to the paper on this subject (*ante*, p. 170), it may save some perplexity if I inform entomologists that the structures described in the paper are those called battledore scales, or male plumules, or androconia. As no allusion is made in the paper to the fact that the structures are those known and figured by so many entomologists, and as this was pointed out at the meeting of the Society at which the paper was read, it is desirable that this statement should be made.—D. S.; p. C.N.H. Soc.

If Mr. Rickard, who contributes to the June 'Entomologist' an article with the above heading, had ever studied the androconia of butterflies, he would have at once understood why his supposed "fungi" were confined to the male sex of the insects examined. We recommend his examination of Wonfor's articles and illustrations in the 'Journal of Microscopical Science,' new series, vols. viii. and ix.—SAMUEL H. SCUDDER; Cambridge, U.S.A., June 7th, 1896.

GYNANDROUS *INO* (*PROCRIS*) *GERYON*.—I went out, on June 1st, to get a few specimens of this insect for friends, and found males largely predominating in numbers. Whilst hunting up sufficient females to make the numbers even, I took one insect which had a normal male feathered antenna on the right side and a slender female one on the other. On setting this specimen, I found that the right wings were a shade longer and larger than the left, which seems corroborative evidence of hermaphroditism. I do not find that the sexes in this insect are exactly similar in size, the males being a trifle the larger. I am not sufficient of an entomologist to know if the above is conclusive evidence of hermaphroditism, or to be able to supplement it, or even to be aware if the case is at all unusual.—HENRY H. SLATER; Thornhaugh Rectory, Wansford, Northants.

[The specimen is certainly gynandrous ("hermaphrodite"). In the 'Wiener Entom. Zeitung,' 1884, there is a figure of an example of *Ino ampelophaga*, in which the abdomen appears to be that of a female, whilst the right antenna is distinctly male and the left antenna female in character.—ED.]

CAPTURES AND FIELD REPORTS.

NOTES ON THE SEASON FROM THE CHESTER DISTRICT.—A torrid summer in 1895, followed by a winter that would have done duty for the South of France! Cheshire newspapers recorded the appearance, out-of-doors, of butterflies in January! I captured my first, in the open, on February 11th—a hybernated *Vanessa urticae*. Long before that date, as early as February 3rd, *Phigalia pedaria* (*pilosaria*) had been common enough on our gas-lamps. I continued to take the species in Delamere Forest, from oak-trunks, by day, until April 11th. The captures showed the usual range of colour variation—from pale grey with indistinct markings to specimens strongly marked, and thence on, but rarely, to unicolorous and almost black ones. *Hybernia rupicapra* I saw on the gas-lamps, Feb. 8th. One of the surprises of the season here has been the scarcity of

H. leucophæaria. Taking Delamere Forest as representative ground, I captured two on Feb. 8th, four on Feb. 22nd, and five or six (the last) on March 7th—including a pale grey form with the markings in barest outline. *Nyssia hispidaria* has also been scarce with us. I did not find it before March 7th, when I took a couple of males developing their wings on oaks about three feet from the ground. On March 28th I found a third and last specimen—another male—at rest on a beech. *H. progenmaria* and *Anisopteryx æscularia* appeared on the gas-lamps, Feb. 20th; but the latter moth has been altogether less plentiful than in previous years. The sooty, unicolorous form of *H. progenmaria* var. *fuscata* was a frequent visitor at the gas-lamps. *Larentia multistrigaria* turned up in Delamere Forest—the first on Feb. 22nd. At the beginning of April this species was succeeded by *Lobophora lobulata*, a moth which is sometimes mistaken for *L. multistrigaria* from its similar appearance and habit of resting by day low down on palings or oaks. *Asphalia flavicornis* I took from March 7th to the end of the month. Although I followed Mr. Hamm's hint (Entom. xxviii. p. 182), and worked for it systematically, I did not find the moth more abundant than in my previous experience. *Diurnea fagella* was abundant on the forest oaks from March 28th to April 18th, when it was nearly over. I got a nice series, which showed the colour gradations from nearly white and slightly marked to almost unicolorous and black. Of *Amphidasys strataria* (*prodromaria*) I picked a paired couple from an oak on March 28th, and another couple from an oak on April 4th. This species I specially sought for, and its scarcity can be gauged when I say the two pairs were the result of ten hours' hard work. The most interesting catch in the early months was *Tephrosia biundularia*, in Delamere Forest, from March 28th till the end of April. This was the spring brood, which I had never met with before—in fact, I had not seen the insect at all for the last four or five years. As a rule, the Delamere forms range from brownish- or ochreous-grey to almost black. There is a well-defined, white, zigzag line parallel with the margins of all the wings; and one, sometimes two, black, outward-bent zigzag lines, less distinct, cross the median portions. But the type, or a very near approach to it, occurs in the forest as well, though rarely. I have only seen one of these—a very beautiful specimen taken by Mr. Crabtree, of Manchester, on April 18th. Equally associated with the season's captures of this interesting moth is Mr. Hargreaves (Mr. Cattermole) of Mr. W. J. Lancaster's "Private Secretary" Company, whose frequent companionship I had the pleasure of enjoying during March. This gentleman obtained some specimens which I think may justly be described as almost, if not quite, black in ground colour. Since then common insects have indeed been common and early up to this very hot June. Amongst them I may mention an abundance of that lovely geometer, *Timandra amataria*, by marshy ditches near Chester. I took the first on May 27th. The pink borders and stripe were very conspicuous in some examples, whilst in others they are nearly absent. Just as abundant, about ponds and marshes during the latter part of May and beginning of June, was the more sombre wainscot-coloured *Phibalapteryx lignata*.—J. ARKLE; 2, George Street, Chester.

ANOSIA PLEXIPPUS IN HAMPSHIRE.—In the 'Field' of June 6th, Mr. E. G. B. Meade Waldo reports having seen, on May 28th last, a fine fresh specimen of *Danais chrysippus* in a field of trifolium close to his house at Lyminster. The specimen seen was evidently *Anosia plexippus*, and

the note is of especial interest, as I believe this to be the first instance of this species having been seen so early in the year. In the years 1885-6 several specimens were observed, all of which were, so far as I am aware, noticed during the autumn.—F. W. FROHAWK.

NOTES FROM WALES.—I was fortunate to take a nice black variety of *Tephrosia crepuscularia* on April 28th in this district. With the exception of a pale waved line on the hind marginal area of fore and hind wings, there are no other markings. The pale form has been common and is still out. It appears to be a good season for Lepidoptera. I have been pleased to again see *Pieris brassicae* in fair numbers; it had been very scarce since 1893. Larvæ are very abundant, especially on oak. Those of *Pæcilocampa populi*, of which I have seen many, have been much infested with ichneumonids. The almost general feeder, *Bombyx neustria*, is to be seen nearly everywhere.—T. B. JEFFERYS; Langharne, Carmarthenshire, June 1st.

PLUSIA MONETA AT WATFORD.—A fine specimen of this lovely moth was taken by Mr. Arthur Cottam, on June 19th, at about 10 p.m., flying over honeysuckle in my garden.—C. E. FRY; Watford, Herts, June 22nd, 1896.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON. — *June 3rd, 1896.*—Dr. D. Sharp, F.R.S., Vice-President, in the chair. Mr. Gervase F. Mathew exhibited the new species of *Leucania*, *L. flavicolor*, recently described by Mr. Barrett (Ent. Mo. Mag., 2nd series, vol. vii. p. 99), and also the varieties of *L. pallens* noticed by Mr. Barrett in the same article (l. c. p. 100). He also exhibited a remarkable variety of *Mamestra abjecta*, which bore a close resemblance to *Apamea gemina* var. *remissa* and to *Hadena genistæ*, and a bred specimen of *Eupithecia castigata* (?), with nearly the whole surface of the wings (the margins excepted) denuded of scales. Mr. Elwes exhibited a collection of butterflies taken in the neighbourhood of Gibraltar during last April, and said that he had found the district very unproductive, owing to the great drought. Mr. J. J. Walker remarked that Mr. Elwes had been very unfortunate, as during three spring seasons his experience had been very different; at the same time it seemed to be agreed that Spain, as a whole, was not so rich in Lepidoptera as in other orders of insects. Dr. Sharp exhibited, on behalf of Mr. Hampson, specimens of the female of *Oiketiscus crameri*, recently sent by Mr. Dudgeon from Sikkim. The females in this species are so maggot-like that it is difficult to recognise them as perfect moths. There were also two pupa shells, one of which was used as a receptacle for eggs, and in the other eggs had hatched, so that it had the appearance of a pupa filled with young larvæ. Mr. R. W. Lloyd exhibited a specimen of *Athous hæmorrhoidalis*, from Savernake Forest, Wilts, with a curious malformation of the right antenna. Mr. Waterhouse exhibited several branches of oaks from the New Forest entirely denuded of foliage, and stated that throughout large tracts of the Forest the oaks had been stripped of their leaves in the same fashion by lepidopterous larvæ, especially *Cheimatobia brumata*, *Hybernica defoliaria*, and *Tortrix viridana*. Certain

trees, however, though situated among the denuded trees, had quite escaped. Dr. Sharp suggested that they belonged to a different species; but Mr. Waterhouse said that he had carefully examined them, and that this was not the case. Mr. McLachlan said that the immunity of the trees referred to was probably due to irregularity in coming into leaf. The discussion was continued by Mr. Elwes, Mr. Champion, Mr. Blandford, Mr. Jacoby, and others. Mr. Tutt exhibited living pupæ of *Enodia hyperanthus* and *Epinephele ianira*, and pointed out how different the pupæ of these two species were in general appearance, structure, and cremastral attachment from each other. He pointed out that these two species had for a long time been erroneously placed in the same genus, but that, in all stages, they were widely separated, and that not only should they be placed in different genera, but that they appeared to belong to different tribes—*Enodia hyperanthus* being in the Cœnonymphidi and *Epinephele ianira* in the Epinephelidi (vide Entom. Record, vii. p. 301). He also exhibited living pupæ of *Thecla pruni* which had been sent to him by Mr. H. Mousley. He called attention to the great resemblance that the pupa bore, in its dorsal aspect, to a bird-dropping. Black in ground colour, the two whitish prothoracic patches, and the similarly coloured metathoracic patch which extended transversely across the constricted waist, give it a resemblance that cannot be misunderstood. Mr. Blandford exhibited live specimens of *Callidium variabile*, L., bred from the bark of beech timber from Blenheim Park. Mr. A. J. Chitty exhibited two specimens of *Osphya bipunctata*, F., taken by himself and Mr. J. J. Walker at Chattenden Roughs, and two species of *Psylliodes cyanoptera*, Ill., from Wicken. Canon Fowler exhibited specimens of *Xyletinus ater*, Panz., taken by Dr. Chapman in Herefordshire; this was the first time this beetle had been recorded from this or the neighbouring counties. Mr. Blandford exhibited and described series of Tropical American butterflies from the Godman-Salvin collection, arranged to show the existence and geographical distribution of homeœochromatic groups. Mr. Elwes characterised the exhibit as the most interesting that had been before the Society for many years, and hoped that the series would not be broken up, as was intended, until an opportunity had been found for full discussion of the various questions raised. The latter point was also urged by Dr. Sharp and Col. Swinhoe, and at the conclusion of the meeting Mr. Blandford announced that Mr. Salvin had kindly consented that the series should be kept intact in order that it might form the subject of a special discussion later in the year, and that he himself would defer the publication of his remarks in view of the anticipated re-opening of the matter. Mr. Tutt having carefully examined the specimens of *Leucania flavicolor*, said that he considered it as highly probable that it was a remarkable form of *L. pallens*, but that more material was required before a final opinion could be formed. The remarkable transverse (elbowed) line of dots crossing the fore-wings was exactly parallel with that of *L. straminea* and *L. impura* ab. *punctatilinea*, and for an aberration of this character to occur in *L. pallens* was as probable as in *L. impura*, the typical form of which is but sparingly dotted in the direction of the elbowed line. The hind wings showed almost identical characters in the dark shading, traces of dots in nervures, &c., as the red-aberrations of *L.*

pallens exhibited by Mr. Mathew. He considered that until the matter of its specific distinctness was finally settled, Mr. Barrett had erred on the right side in giving it a distinctive name, even if the name subsequently fell as an aberration of *L. pallens*. Dr. Chapman communicated a paper "On the Phylogeny and Evolution of the Lepidoptera from a pupal and oval standpoint."—W. W. FOWLER, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*May 14th, 1896.*—R. South, Esq., F.E.S., President, in the chair. Mr. Enock exhibited specimens of two very rare aquatic Hymenoptera, *Prestwichia aquatica*, which uses its legs in swimming, and which has not been recorded since its first capture in 1865; and *Caraphractus cinctus*=*Polynema natans*, which uses its wings in swimming. Mr. R. Adkin, a bred series of *Melanippe hastata*, from Sutherland, with series of the same from Sussex and Co. Cork; the larvæ of the first were fed on *Myrica gale*; the Cork series had a pale ochreous tone instead of the usual dead white ground; the southern series were very uniform, whereas the northern examples varied considerably in the black markings. Mr. Barrett, series of *Abraxas ulnata* and *Pieris rapæ* var. *cruciferarum*, from Japan. The former were of the British type, but the latter equalled *P. brassicæ* in size, had a considerable suffusion of black from the base, and in some of the females a partial fusion of the spots. In the discussion which ensued it was suggested that it might be the result of abundance of succulent food. Mr. Carrington remarked on the hardy constitution of the species in Canada, where it experienced extremes of temperature from 60° to 138°. Mr. Tutt noted the oscillation in abundance and rarity of *P. rapæ* in America, where it had survived after a great struggle with a closely allied indigenous species, with which it was supposed to have interbred, and which was now very rare. Mr. Tutt exhibited, for Mr. Merrifield, a number of specimens bred under various degrees of heat and cold—*Aglais urticae*, *Pyrameis atalanta*, *Euvanessa antiopa*, and *Gonepteryx rhamni*. He described the variations in detail, and remarked that it was mainly the upper sides which had been affected, whereas the under sides, which in the Rhopalocera were developed for protection, were but slightly influenced. *T. orbona* (var. *curtisii*) and these species were not parallel cases of variation, as in the former it was the upper side that was protectively coloured. Mr. Tutt read a paper entitled "Is Cold the cause of Melanism in Scotch specimens of *Triphana orbona*?" in which he showed, by magazine references, that the area of distribution of var. *curtisii* was by no means the coldest portions of the country, and that there the shallows flowered quite as early as in the South of England. He was of opinion that the variation was wholly brought about by utility, that the species was protectively coloured. In the subsequent discussion several members considered that the dark variation in this species was a return to the ancestral form, and that every evidence showed that the processes of evolution were still in progress.

May 28th.—C. G. Barrett, Esq., F.E.S., Vice-President, in the chair. Mr. A. H. Bartlett, M.A., 34, Vanbrugh Park, Blackheath, was elected a member. Mr. McArthur exhibited a bred series of *Hypsipetes ruberata* and *H. trifasciata*, from Hoy, which as imagines

were inseparable. The latter species was reared on heath; also, from the same locality, *Eupithecia venosata*, *E. pulchellata*, *Melanippe fluctuata* var. *neapolisata*. Mr. Warne, the curious wine-glass-shaped cocoon of a spider, said to be probably *Agelena brunnea*, found suspended among heather in the New Forest. Mr. Sauzé, a small specimen of *Sinodendron cylindricum*, taken by Mr. Adkin at Worthing; and *Ledra aurita*, one of the remarkable Membracidae; *Silpha quadrimaculata*, *Hippobosca equina*, and *Hoplia philenthus*, all from the New Forest. Mr. West, on behalf of Mr. McArthur, specimens of *Chrysomela arvensis* and *C. sanguinea* from Hoy, with *C. distinguenda* from the South of England, for comparison with the local northern *C. sanguinea*. Mr. Edwards, a twig of fir containing the nodule and larva of *Tortrix piceana*, from Brockenhurst. Mr. Filer, larvæ of *Pæcilocampa populi*, and *Trichiura cratægi*, from Epping Forest. Mr. Montgomery had had a large brood of larvæ of *Saturnia carpini*, of which a very considerable number were attacked by ichneumons. Mr. Adkin remarked on the abundance of parasites he had seen in his garden and elsewhere. In reporting on the Field Meeting at Brockenhurst, Mr. Edwards said that imagines were more plentiful than last year, and that larva-beating was very successful. The weather was fine, and some twelve members were in attendance during the three days. *Macroglossa fuciformis* and *M. bombyliiformis* were both captured. Larvæ of *Limenitis sybilla*, *Catocala promissa*, *C. spona*, *Taniocampa miniosa*, *Spilosoma mendica*, *Thecla quercus*, and *T. betulæ* were among the species found.

June 11th.—C. G. Barrett, Esq., F.E.S., Vice-President, in the chair. Mr. Manington, 141, Broomswood Road, Wandsworth Common, was elected a member. Mr. Lucas exhibited specimens of *Ichnura elegans*, *Pyrrhosoma minimum*, and a series of *Platetrum depressum*, including a male which had not developed the blue colour characteristic of the sex. They were taken by Mr. Turner at Folkestone on May 17th. Mr. West, of Streatham, a series of *Macroglossa fuciformis*, taken at Brockenhurst during the Whitsun Field Meeting. Mr. Barrett, the specimens of the new Noctua, *Leucania flavicolor*, recently described by him, and which were captured on the coast of Essex by Mr. G. F. Matthew. It was apparently allied to *L. pallens*, from which it differed not only in colour and markings, but also somewhat in the shape of the wings. It was thought that if the exhibit were again brought up, after members had examined their own series, a discussion could take place. Mr. Barrett also exhibited several beautiful bright uniform red forms of *L. pallens* from the same locality; a very large and dark specimen of *Mamestra abjecta*, and a very beautiful var. of the same, having all the markings clear and distinct upon a light ground; a var. *remissa* of *Apamea gemina*, and a specimen of *Hadena genistæ*, to both of which the var. of *M. abjecta* was comparable in many respects. Mr. N. E. Warne, a series of *Procris statices*, from Keswick, and a few specimens of *Emmelesia adæquata* (*blandiata*), one of which had the central band almost complete. Mr. Tunaley a specimen of *Enupis tessellata*, having in its grasp a *Tipula*, which it had captured. The middle legs of the *Enupis* clutched the shoulders of the wings of the *Tipula*, the hind legs were bent under the wings and body, while the fore legs of the *Enupis* were free to grasp any support. The *Tipula* was thus held in a vice, and frequently lost its legs in the struggle.

The *Enupis* repeatedly pierced the thorax of the *Tipula* with its lancet, but was not always successful, owing to the struggles. This could easily be observed if the insects were placed together in a small box. He also exhibited an asymmetrical form of *Coremia designata*, from Rammore, having the band of the right primary narrower than usual, but filled in completely with the dark colour. The inner margin of the band was more straight than in normal specimens. Mr. Mansbridge, a specimen of *Syrichthus malva*, having a notch at the apex of all the wings, in which the cilia were present, but shorter than usual. A discussion ensued, some members considering it to be caused by an injury to the pupa, and others thought that the cilia were shorter than usual, and that the proximity of the white patch somewhat accentuated the appearance of the notch. Mr. Edwards, a specimen of the rare *Papilio danisepa*, from the Khasia Hills, and a short series of *Leptocircus curius*. He then read a few notes on the very aberrant genus of the Papilioninæ, *Leptocircus*. After enumerating the species, and stating the characters by which it differed from the other genera of the family, he described its distribution, and quoted the opinions of the various collectors that the species were mimics of species of Neuroptera both in their appearance and habits. It was noted by various members that the defoliation of the oaks was this year not so much due to the attacks of *Tortrix viridana*, but to the larvæ of the different species of *Hybernina*. It was also remarked that oaks having bright green foliage had comparatively escaped attack, but that trees which had leaves of a dark brownish green were mostly completely stripped. — Hy. J. TURNER, *Hon. Report Sec.*

Correction.—In report of April 23rd (*ante*, p. 199), delete "The extreme colour on this point," and insert, "He considered that the evidence pointed to cold being one of the chief factors in the darkening of the species in its northern localities." Add at the end, "In his reply Mr. Adkin thought that although the extreme colour of var. *curisii* may have been developed for protection, much further observation was necessary before it could be proved."—H. J. T.

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—April 20th, 1896.—Mr. P. W. Abbott, Vice-President, in the chair. Mr. H. Foster Newey, of Hampton-in-Arden, was elected a member of the Society. Mr. R. C. Bradley said that he had learnt that a specimen of *Vanessa antiopa* was taken in Sutton Park some years ago by Mr. Titley. Mr. G. T. Bethune-Baker said that his father saw one at Moseley ten or twelve years ago; and Mr. Wainwright said one was seen in Wyre Forest by the Rev. R. R. Rodgers about the same time. Exhibits:—By Mr. P. W. Abbott, a living larva of *Agrotis ashworthii* taken at Llangollen the previous day. By Mr. W. Harrison, *Teniocampa gracilis* from Arley, and a pupa of *Acherontia atropos* from Chalcot. By G. W. Wynn, *Orthosia suspecta* from Northfield, &c. By Mr. Petley, pupæ of *Brephos parthenias*, and the pupa-cases showing manner of pupation; they had bored deeply into bark and cork supplied to them, and pupated inside. By Mr. J. T. Fountain, larvæ of *Arctia villica* from Dawlish. By Mr. A. H. Martineau, a piece of wood from the stump of an old tulip tree at Middleton Hall,—it was very much perforated by a large colony of *Crabro interruptus*, usually a rare insect; also male and female

specimens of the perfect insects, cells, and parasites. By Mr. C. A. E. Rodgers, a nice variable series of *Taniocampa munda* from Malvern; one specimen had a broad median band and very little trace of any of the usual markings. Also varieties of *T. instabilis*, one closely approaching *T. stabilis* in colour and markings, the other resembling *T. populeti*, especially in the mousey colour of the thorax. By Mr. R. C. Bradley, some very beautiful photographs of the wings of insects, chiefly Tipulidæ, made by Mr. C. J. Bignell, and they were much admired for their definition and exactness. By Mr. Wainwright, *Xylocampa lithorhiza* from Knowle, &c. By Mr. H. Foster Newey, another lot of drawings of larvæ and pupæ in black and white, intended to illustrate a work on these stages of British Lepidoptera to supplement Newman's book. They were drawn to a uniform scale of four diameters, and were wonderfully distinct.

May 18th. — Mr. P. W. Abbott, Vice-President, in the chair. Exhibits:—By Mr. R. C. Bradley, a few ichneumons, *Anomalum bellicosum* from the New Forest, and a pair of *Banchus pictus* from Colwich. By Mr. P. W. Abbott, a number of insects taken on the willows at Wyre Forest last Easter. He said that the willows were more covered by moths than he had ever seen them before, *Taniocampa miniosa* and *Oporina croceago* were both common, and all the usual species were abundant. He also had three *Taniocampa opima*, not hitherto recorded locally; a *Lobophora lobulata* had also been attracted. By Mr. Wainwright, a boxful of Aculeates, including amongst others *Nomada bifida* from Colwich. Mr. Martineau said that Andrenidæ had been more than usually abundant this spring where he had observed them. By Mr. J. W. Smallwood, a series of *Amphidasys betularia* bred from one black and one normal insect (sexes not recorded); in the series were eight females of which six were black, and seven males of which one only was black. Mr. Wainwright said that all the black ones he had taken were females, and he believed that the variety, though not peculiar to that sex, yet had its origin in the female, and the female had the greater tendency to vary in that direction. Mr. H. Foster Newey said that he had bred a series from two black parents, and everyone came black, male and female alike. Mr. P. W. Abbott asked for the experience of members with regard to *Tephrosia crepuscularia*; he had just been taking light and dark ones intermingled, and also intermediate ones, being dark splashed with white, and he thought they were all one species.—COLBRAN J. WAINWRIGHT, Hon. Sec.

CAMBRIDGE ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—A meeting of the Society was held at the rooms of the Hon. Librarian on May 15th, the President in the chair. Mr. Rickard exhibited a case of beetles collected by himself at the Cape, including the rare genus *Ischnostoma*. Mr. Fleet, specimens found at Cambridge of the larvæ of the new British moth *Plusia moneta*; the young larva is very different in form and habit from the adult, and lives in a bunch of terminal leaves fastened together of monkshood. The President remarked on a work just published in Germany by Dr. Standfuss. This gentleman has made experiments in crossing species and varieties of Lepidoptera, and some of his results are certainly of interest.

Among other results he finds that hybridisation between closely-allied species produces a remarkable amount of hermaphrodite progeny. The President also exhibited one of the basket-worms, discussed at the last meeting; the specimen was extracted from its basket, and showed great differences when compared with ordinary caterpillars. He also showed another very exceptional larva from Madagascar, which he believed to be one of the "slug-worms" of North American naturalists. He then read a paper upon the "Destruction of Forests and its Results." He said that much wanton destruction of natural conditions occurs in all parts of the world, which in the long run impoverishes humanity. In connection with this the Californian Academy of Sciences has recently drawn up a report for presentation to the Congress of the United States protesting against such reduction of forest preserves, "it being a trespass of an inheritance which should by every legitimate means be preserved by this generation for those who are to come after." It has been conclusively proven that the terrible droughts, floods, and famines in Southern Russia are directly caused by the destruction of timber. It is also a well-established fact that the droughts and failures of crops in a large area of France are due to change in climate caused by the destruction of forests since the Revolution. In Britain this does not interest us so immediately, as we have a sufficient and moderate rainfall without forests, but in our Colonies it is not so. He had information that much unnecessary destruction occurred; and that in New Zealand much loss had recently been caused by drought. The preservation and management of forests ought to be considered one of the most important duties of Colonial Governments. From a naturalist's point of view it was sad to think that this destruction of forests involved the extermination of many of the animals of the world without our having acquired any knowledge about them, and in many cases without our having even seen them.

—C. J. WILKINSON, *Hon. Sec.*

RECENT LITERATURE.

Our Country's Butterflies and Moths, and how to know them. A Guide to the Lepidoptera of Great Britain. By W. J. GORDON. With a thousand examples in colour by H. LYNN, and many original diagrams. Crown 8vo, pp. viii, 150; plates 32. London: Day & Son; and Simpkin, Marshall, Hamilton, Kent & Co. 1896.

As an aid to the identification of the species of Lepidoptera occurring in this country, especially as regards the Macro division, this marvellously cheap little book should be of assistance to the beginner. A large number of the figures are really very good, but it must be added that there are several which are simply grotesque caricatures of the species they are supposed to represent. Chapters I. and II. are respectively alphabetical lists of the popular and the scientific names of the species, and also serve as an index to the plates; but to these latter Chapter III. appears to be the systematic key. The remarks under the head "Sortation," although somewhat sketchy, are not

uninteresting; but we think that the "keys by which the groups are sorted into families, the families into genera, and the genera into species," hardly promise to be of much service in the direction indicated.

The Hymenoptera-Aculeata of the British Islands. By EDWARD SAUNDERS, F.L.S. Demy 8vo, pp. viii, 391; plain plates 3. London: L. Reeve & Co. 1896.

POSSIBLY one reason why bees, wasps, and ants have not, so far, attracted the serious attention of those who are interested in the entomological fauna of our country is that there was no really up-to-date text-book on Hymenoptera-Aculeata available. With the advent of the important work now before us there is little doubt that our native species will be more closely studied, and interest in them be largely developed. The author deals with 374 indigenous species of Aculeates, and these are placed in four sections as follows:—Heterogyna (ants), 20; Fossores (sand wasps), 127; Diploptera (true wasps), 23; Anthophila (bees), 204. In the Introduction, which treats at some length of the anatomy of Hymenoptera, there are some useful hints on collecting and preparing specimens.

We have also received the following:—

'The Crambidae of North America. By C. H. Fernald, A.M., Ph. D. 8vo, 93 pp., 10 plates. Massachusetts Agricultural College. 1896.'

'Report of the Entomological Department of the New Jersey Agricultural College Experiment Station. By John B. Smith, Sc.D. For the year 1895. Trenton, N.J. 162 pp. The John L. Murphy Publishing Company. 1896.'

'The Honey Bee: a Manual of Instruction in Apiculture. By Frank Benton, M.S. 118 pp., 12 plates, and many illustrations in text. Washington: Government Printing Office.' (Bulletin No. 1, new series.)

'United States Department of Agriculture. Division of Entomology:—The San Jose Scale, its occurrences in the United States, with a full account of its Life-history, and the Remedies to be used against it. By L. O. Howard & C. L. Marlatt. 80 pp. Washington: Government Printing Office. 1896.' (Bulletin No. 3, new series.)

'The Grass and Grain Joint-Worm Flies and their Allies: a consideration of some North American Phytophagic Eurytominae. By L. O. Howard, Entomologist. 24 pp. Washington: Printing Office. 1896.' (Technical Series, No. 2.)

'Cornell University Agricultural Experiment Station, Ithaca, N.Y. Entomological Division:—Climbing Cutworms in Western New York. By M. V. Slingerland. The University, Ithaca, N.Y. 1875.' (Bulletin, 104). Also by the same author:—'Wireworms and Bud Moth' (Bulletin, 107); and 'The Pear Psylla and the New York Plum Scale' (Bulletin, 108).

'The Mediterranean Flour Moth (*Ephestia kuehniella*, Zell.) in Europe and America. By W. G. Johnson, A.M., Assistant Entomologist. Appendix to the Nineteenth Report of the State Entomologist of Illinois. 65 pp. Springfield, Ill. Ed. F. Hartman. 1896.'

EXCHANGE.

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Duplicates.—*Quercus* (cocoons from larvæ taken on heather in April); pupæ of *Io. Desiderata*.—Very numerous.—J. T. Fountain; 58, Darwin Street, Birmingham.

Duplicates.—*Agabus paludosus*, *Tachyusa flavitarsis*, *Eusphalerum primulae*, *Polydrusus cervinus*, *Rhagonycha elongata*, *Gastrophysa raphani*, *Haltica ericeti*, *Corticaria serrata*.—Dr. J. Harold Bailey; 128, Broad Street, Pendleton.

Duplicates.—Imagos of *Populeti**, *Munda**, *Incerta** (dark), *Gothica**, *Radiata** and intermediates (fine forms), *Alni** (fine); pupæ of *Templi*. Acceptances answered in four days.—J. N. Young; 85, Fitzwilliam Road, Rotherham.

Desiderata (for new illustrated work on larvæ and pupæ).—Larvæ and pupæ of *Lucina*, *Megara*, *Abbreviata*, *Albicillata*, *Saponariae*, *Nigrocincta*, *Xerampelina*, *Cursoria*, *Vulgata*, *Temerata*, *Gnaphalii*, *Centum-Notata*, *Pusillata*, *Rubiginea*, *Testudo*, *Pulchellata*, *Biundularia*, *Festuca*, *Albulata*, *Caniola*, *Isogrammata*, *Lariciata*, *Plumbeolata*, *Palustris*, *Impluviata*, *Venosata*, *Indigata*, *Griseata*, *Cœnosa*, *Vetusta*, *Psittacata*, *Unangulata*, *Ilicifolia*, *Emarginata*, *Lychnitis*, *Auricoma*, *Anachoreta*, *Valerianata*, *Coronata*, *Sylvinus*, *Cambricaria*, *Scrophulariae*, *A. Urticae*, *Citraria*.—W. A. Rollason; 1, Newhall Street, Birmingham.

CHANGES OF ADDRESS.—Sergt.-Major C. Block, from Bonnington, Edinburgh, to 39, Willoughby Terrace, Stoke, Ipswich. Louis B. Prout, to The Elms, 246, Richmond Road, Hackney, N.E.

CORRECTION.—The writer of the note on *Vanessa c-album* in South Wales (Entom. 195) is A. D. Imms, not A. D. Simms as printed.

MEETINGS OF SOCIETIES.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.—Meetings on the 2nd and 4th Thursdays in each month, at 8 p.m.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—The meetings of this Society (held at the London Institution, Finsbury Circus, E.C.) will take place on the 1st and 3rd Tuesdays in each month, from 7.30 to 10 p.m. as heretofore.

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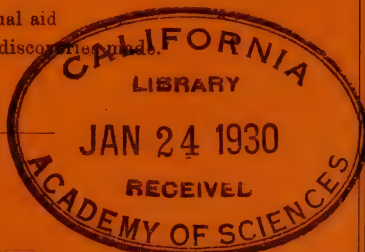
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AUGUST, 1896.

[No. 399.]

MELITÆA CINXIA, ABERRATIONS.



ALTHOUGH *M. cinxia* is subject to considerable variation in the pattern of the under surface, which seldom agrees exactly in any two specimens, such striking forms as those represented in the above figures are of very exceptional occurrence.

Fig. 1 is a remarkably beautiful female: the upper surface of the primaries has all but lost the usual transverse bands crossing the apical half, while the basal half is heavily clouded; the secondaries are rich fuscous, showing only the submarginal fulvous rings and two small fulvous spots in the discal cell; the under surface of the secondaries has all the usual black markings so greatly intensified that many of the normally light basal markings are entirely obliterated, giving the specimen a very rich appearance; crossing the primaries are series of elongated marks.

Fig. 2, a male, is almost normal on the upper surface, but the pattern of the under surface of the secondaries is very aberrant, the fulvous basal area being almost devoid of markings, the median light band is heavily blotched with black, and the fulvous band strongly outlined with black. Out of some hundreds of specimens I have bred I obtained a somewhat

similar male, having the median light band heavily marked with broad black blotches.

Both specimens figured above were captured at Ventnor some years ago, and are now in the rich collection of Mr. A. B. Farn, to whom I am indebted for the loan of them for figuring.

F. W. FROHAWK.

July, 1896.

AMONG THE SPRING BUTTERFLIES IN THE ARDENNES.

BY W. HARCOURT-BATH.

LAST May I took a flying trip to the Forest of Ardennes in the Belgian provinces of Namur and Luxemburg. Leaving London on Saturday morning, May 23rd, I arrived the same night at Brussels, where I had to break my journey. The next day, however, at about 2 p.m., found me at my first destination, the picturesque and romantic little town of Dinant-sur-Meuse. Being cold and dull when I arrived, I determined to postpone entomological operations until the following day. The whole of Monday I spent in traversing the high, breezy uplands called the "Famenne"—a distance of twenty miles—to Rochefort, from whence in the evening I took train to Poix, situated in the sheltered valley of the Lomme. The next four days were occupied in exploring the Valley of Poix as far as St. Hubert, and the thickly-wooded country around Grupont. The weather was tolerably favourable for day work, to which I confined myself. The nights and early mornings were exceedingly chilly, but the days were fine, although there was upon the whole perhaps more cloud than sunshine. I found vegetation rather backward, which can be readily understood when I remark that the mean average elevation above the sea-level of the region under consideration is between 1000 and 1500 feet. At St. Hubert (which the Baron de Selys informs me is a good locality for the *Lycænidæ*) the oaks were only just in bud, while the hawthorn was not yet in blossom; and in all the higher meadows the wild daffodil (*Narcissus pseudo-narcissus*) was still in full flower, although it had disappeared from sight in the midland counties of England for at least five or six weeks. As a consequence, I did not find butterflies plentiful, except in the most sheltered situations at the lower elevations. If I had postponed my visit until a week or a fortnight later, I should have procured a longer series of many species which were only just commencing to make their appearance. Orthoptera were well in evidence, the field-cricket (*Acheta campestris*) occurring in great numbers in many localities, in addition to several species of field-grasshoppers in the imago state, although so early in the season.

The woods in the district visited are mostly composed of beech and oak, the former tree being at its best, and looking beautiful indeed, with its cheerful, light green foliage. There are also numerous coppices of birch and hazel, in addition to artificial plantations of spruce-fir and other conifers. The undergrowth consists chiefly of hazel and bilberry, the latter being found principally in the beech woods. Sloe was seen plentifully in several localities, being frequently adorned with nests of the lackey-moth (*Bombyx neustria*). The hill-sides around Grupont presented a gorgeous appearance with the golden flowers of the broom, which was in full bloom, and entirely takes the place of the gorse in our own country, the latter shrub being unable to withstand the cold winter climate of the Ardennes. Heather of several species clothed the more sandy uplands and waste places.

The principal products of agriculture appear to be corn of different kinds, sainfoin, and Dutch clover. Apple trees were the fruit trees mostly in evidence in the orchards. In all the lower situations, beautiful, rich natural meadows abound, wherein flourished a great profusion of flowers, affording good collecting-grounds for the entomologist. These meadows are irrigated in a similar way to what they are in the Alps, namely, by means of trenches, along which the water of streams is carried from higher levels and made to overflow.

For the edification of those who may be fond of bigger game than butterflies, I will mention that wild boars are exceedingly numerous in the forest, and commit great depredations upon farms in the vicinity. Wolves are still found, although in gradually decreasing numbers each year. Of bears I could not obtain any information; but they probably still linger in some of the more unfrequented parts of this wild domain, as they were certainly known to do thirty years ago.

I will now supply a summary of the number of species of butterflies which I obtained each day, with particulars of the weather experienced:—

May 24th,	3 species.	Very dull and cold.
„ 25th,	24 „	Fine most of the day, with a very cold wind.
„ 26th,	21 „	Fine, with a cold wind.
„ 27th,	21 „	Fine in the morning, cloudy in the afternoon; a heavy thunderstorm occurred during the night.
„ 28th,	22 „	Dull all day to 4 p.m.
„ 29th,	28 „	Dull all morning, fine in the afternoon.

I may here say, for the sake of comparison, that the largest number of butterflies which I have met with on the wing in the month of May in the South of England is twenty.

The number of species of butterflies which I encountered in the Ardennes during my brief visit was thirty-four, of which

thirty-three were seen on the wing, one being in the larva state only.

The following is a list of the species encountered, with localities, &c.:—

PAPILIONIDÆ (2 species).

Papilio podalirius.—Ten specimens, mostly in good condition; one of them, a female, being a magnificent large, rich-coloured example. Celles, Ciergnon, Grupont. *P. machaon*.—Three specimens, only one in good condition. Valley of Poix, Grupont.

PIERIDÆ (6 species).

Pieris brassicæ.—Only just commencing to appear. *P. rapæ*.—Very plentiful. *P. napi*.—Very plentiful. *Euchloë cardamines*.—Abundant. *Colias hyale*.—Four specimens. Celles, Grupont. *Gonepteryx rhamni*.—Hybernated specimens; very numerous.

LYCÆNIDÆ (8 species).

Chrysophanus dorilis.—Abundant. Ciergnon, Valley of Poix, St. Hubert, Grupont. *C. phloxas*.—Several specimens. *Thecla rubi*.—Several specimens from different localities. *Lycæna astrarche*.—Several specimens. Grupont. *L. icarus*.—Numerous. *L. argiolus*.—Scarce. Celles, Grupont. The pabulum, I think, must be sloe, as there is no holly whatever. *L. minima*.—Several specimens in different localities. *L. semiargus*.—Grupont. A small series.

ERYCINIDÆ (1 species).

Nemeobius lucina.—Two specimens. Grupont.

NYMPHALIDÆ (9 species).

Vanessa urticæ.—Hybernated examples numerous; larvæ seen in all stages of growth on nettles. *V. io*.—Several hybernated examples seen. *V. antiopa*.—One hybernated specimen at Poix. *V. atalanta*.—Three larvæ on nettles.

Melitæa cinxia.—Several specimens. Grupont. *M. athalia*.—Several specimens. Grupont, Celles, Ciergnon, St. Hubert.

Argynnis selene.—Several specimens. Grupont. *A. euphrosyne*.—Very plentiful. *A. dia*.—Two specimens. Valley of Poix, Grupont.

SATYRIDÆ (5 species).

Erebia medusa.—Several specimens. Celles, St. Hubert, Grupont.

Pararge mæra.—One specimen. Ciergnon. *P. megæra*.—Abundant. *P. egeria*.—Several specimens.

Cænonympha pamphilus.—Plentiful.

HESPERIDÆ (3 species).

Spilothyrus alceæ.—Several specimens. Celles, Ciergnon, Valley of Poix, St. Hubert, Grupont.

Syrichthus malvæ.—Very abundant. Ab. *lavateræ*.—One specimen. St. Hubert.

Nisoniades tages.—Very abundant.

FUNGI PARASITIC ON BUTTERFLIES.

By J. C. RICKARD.

IN the July number of the 'Entomologist' (*ante*, p. 215) are two paragraphs referring to a paper on the above subject (*ante*, p. 170). The first is by Dr. Sharp, who correctly states that he pointed out at the meeting at which the paper was read that the objects in question are known as androconia, &c. He also exhibited some numbers of a German magazine in which several of them are figured. The other paragraph is by Mr. S. H. Scudder, who states that if I "had ever studied the androconia of butterflies, he would have at once understood why his supposed 'fungi' were confined to the male sex of the insects examined." He then recommends me to examine Wonfor's articles and illustrations bearing on this subject. I am obliged to Mr. Scudder for this reference.

Neither of these gentlemen seems to have personally investigated the subject, both having referred me to the works of other entomologists. As their remarks throw considerable doubt on my statement as to the fungoid nature of these organisms, I would like to give some reasons for so regarding them.

On the present occasion I will confine my remarks to the parasites of the Pierids mentioned in my paper, as of these I can speak with more confidence than I could of those found on Satyrids and Lycænids. I assert without the least hesitation that all the figures of the so-called androconia of the Pierids that I have seen or heard of represent them upside down. To prove this, stain the wing of *Pieris brassicæ* and transfer the scales (and fungi), while still wet, to a slip of glass. If these are microscopically examined *through* the glass slip, it will be seen that the apex or free extremity of the fungus is that part which has hitherto been regarded as the basal portion. I believe this error has mainly arisen from the fact that the scales and fungi point in opposite directions: if the fingers of one hand are locked in those of the other, the one set of fingers will represent the scales, and the other set the fungi.

If these objects are modified hairs or scales, there is every reason to believe that their surfaces would exhibit striations. Of

these there are no signs; the only things at all resembling striae are the wrinkles seen on the peridium of the fungus of *P. rapæ* and *P. napi*; moreover the stem separates from the peridium at a certain definite spot, where there exists a sort of "hilum." If the fungi were connected with the butterfly's wing by these bulb-like bodies, a large proportion of them would fall off, and the butterfly would lose whatever benefit these so-called androconia afforded, the bulbs remaining attached to the wings as useless incumbrances. On the other hand, assuming these bulbs to be sporocarps of a fungus, what more natural than that they should fall off after they had completed their work of maturing and shedding their spores?

Again, if these organisms are only modified hairs or scales, they would be formed of chitinous material. The fungus of *P. brassicæ* generally has the stem bent to a considerable angle with the body (peridium), but on adding a drop of water the stem straightens out. I submit that if the material was chitin it would not exhibit this sensitiveness to moisture. But this is not all; the sporocarps from dry examples of *P. rapæ* and *P. napi* have a "withered" appearance, the addition of a little water causes them to swell, the wrinkles disappear, and the black spot so conspicuous on the apex of the fungus of *P. agathina* (p. 171) makes its appearance. I repeat that the withering and subsequent "plumping" out on the addition of water indicates a vegetable and not a chitinous substance.

But if up to this point I had felt any doubt as to their character, all doubts would have been entirely dispelled on seeing the wonderful parasite of *Pieris agathina* (see p. 171). Here, again, the sensitiveness to moisture is noticeable. When they are first removed from the wing about one-fourth the length of the basal portion is bent so as to form an obtuse angle with the axis of the body, giving the fungus an unsymmetrical appearance; but after keeping them between glass slips for a day or two, the dampness of the room causes them to straighten out and assume a perfectly symmetrical form. It was the observation of this fact that induced me to add the note on p. 171 relative to the probable origin of the square form of this fungus. A comparison of the "glassy" sporocarp of this fungus with that of the fungus of *P. rapæ* (after damping the latter) will convince anyone of their identity of form and function; and as the parasites of all the Pierids mentioned are closely allied, the demonstration of the apex of one form settles it for all the others. It should be borne in mind that what we see on the butterfly's wing is merely the fructification of a plant whose vegetative organs (mycelium, &c.) are enclosed within its substance. I may also state that the spores of the *brassicæ* fungus germinate freely between slips of glass.

The circumstance of their occurring only on male butterflies

is a singular fact; but I think parallel cases, perhaps equally inexplicable, could be found as pathological occurrences.

It is obvious that if these objects are really fungi, there is no reason why they should not function as scent-producers—which I believe is the office assigned to androconia in general—and in this manner render a service to their host, and supply an additional reason for the belief in that particular form of parasitism known as symbiosis.

Will Mr. Scudder (or some other American entomologist) kindly inform us whether the “fungi” or “androconia” of the yellow variety of *Pieris rapæ* are in any way modified as compared with those of the ordinary white form?

3, Halifax Road, Cambridge.

UNIFORMITY IN PINNING LEPIDOPTERA.

By N. F. SEARANCE, L.R.C.P.

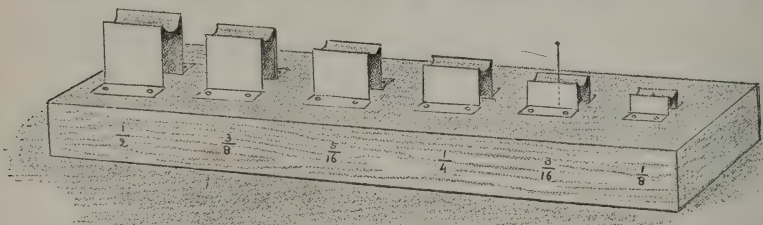
In the recent correspondence on setting and preserving moths (Entom. xxviii. 303, 332; and xxix. 83, 125), I have been disappointed at seeing two points which deserve more serious consideration only mentioned casually, *i.e.* the necessity of having a standard of height of setting, and a way to procure absolute evenness of height. Too much is left to guess-work and individual fancy on these two points.

Every collector whose series are filled up from different sources must, after a time, come to regard his collection with a feeling akin to dissatisfaction. Each individual moth may be without reproach as regards setting, &c., but the *tout ensemble* leaves much to be desired, owing to the various heights of setting fancied by different collectors. Some have the wings touching the paper of the drawer, some are half-way up, and others right up at the top of the pin, giving the whole a ragged and untidy appearance. The text-books are not very clear on the subject; and as some collectors will prefer one style and some another, if much exchanging is done the above unsatisfactory state of affairs is bound to happen sooner or later. Discrepancy in height cannot always be overcome by bringing the higher ones down to the level of the lower; nor is the necessary force required to stick them deeply in the cork unattended with risk to pin and moth.

Could not some leading entomologist lay down a standard of height at which the various-sized insects ought to be set, either in parts of an inch or in millimetres? It is no use saying, “Stick the pin through the moth till there is as much underneath as above,” as all collectors do not use the same sized pins

for the same insects. The advice, too, to pin them so that when set and pinned in the drawer the wings should just clear the bottom, leaves too much to guess-work, and often results in leaving too much or too little pin underneath.

To procure absolute evenness in pinning, I have made a "contrivance," which I hope will be found of use. At any rate, it has the merit of being simple, and easily made by any collector in about an hour, as it only requires the simplest mechanical skill for its construction. It consists of a series of six little "rests" (for want of a better term) of six different heights. These are made from strips of tin varying in width from $\frac{3}{4}$ inch for the highest "rest" to $\frac{1}{4}$ inch for the lowest. These strips are bent into the shape something like the letter **M**. With a fine taper-point punch, a hole is punched through the middle of the central part, and two more through each of the flanges, the latter being to tack the "rest" on to a wooden stand; the central hole is easiest made before bending the strip into the desired shape. The heights of the "rests" (which correspond to the length of pin which will be underneath the moth when pinned) I have made as follows:— $\frac{1}{2}$, $\frac{3}{8}$, $\frac{5}{16}$, $\frac{1}{4}$, $\frac{3}{16}$, and $\frac{1}{8}$ of an inch. This gives a good range of height, $\frac{1}{2}$ inch being for the largest moths—*atropos*, &c.; $\frac{1}{8}$ inch for the smallest Geometers—pugs, &c. The six "rests" are tacked side by side on a



wooden stand, 6 inches long by $1\frac{1}{2}$ half inch wide, and $\frac{1}{2}$ an inch thick. The *modus operandi* is as follows:—Start to pin the moth in the usual way (how I wish a "contrivance" could be made to get the pin in straight). When the pin appears underneath the body of the moth, place the latter on the "rest" appropriate to its size, and push the pin through the hole in the centre of the "rest," till it is stopped by the stand underneath. In this way, no matter what sized pin is used, every moth of the same size must have, to a hair's-breadth, the same length of pin underneath. The difference in a drawerful of moths set in this manner and a drawerful made up with various settings from various sources, is very great; the perfect evenness and regularity of the former contrasting favourably with the "scratch-lot" appearance of the latter.

If anyone who reads this, and wishing to make a "pinner" for himself, cannot make out how the thing is made from the illus-

tration and the foregoing description, which latter, I fear, rather lacks lucidity, I should be most happy, on hearing from him, to send one of the "rests" as a pattern. It is much more easily made than described. The best way to get the correct measurements is to mark them off with a rule on the tin strip before bending into required shape; with the pliers, bending can then be performed with exactness.

Mitcheldean: May 11th, 1896.

A CATALOGUE OF THE LEPIDOPTERA OF IRELAND.

By W. F. DE VISMES KANE, M.A., M.R.I.A., F.E.S.

(Continued from p. 214.)

ANARTA MYRTILLI, *L.*—Very common in all moors and bogs. The colour varies from a bright brownish red (not so brick-red as in some English specimens I have seen) to a dark reddish black. In the bright specimens the white strigæ, &c., are well marked, but in the dark forms (from Markree Castle, Sligo, Toberdaly, King's Co., Belleisle on L. Erne, and Altadiawan, Co. Tyrone) they are partially and sometimes almost wholly obsolete, especially on the basal area (var. *albirena*, Haw.).

HELIACA TENEBRATA, *Scop.*—Rarely met with. Markree Castle (*Miss Cooper*); Killarney (*B.*), and Sneem, Co. Kerry (*R.*).

HELIOTHIS SCUTOSA, *Schiff.*—One specimen was taken Sept. 19th, 1878, by Mr. David C. Campbell, of Ballynagarde House, near Derry, and identified by me. It was netted flying to the flowers of ragweed on the shore of L. Swilly near Buncrana. In view of the doubts raised some time since as to the *bonâ fide* occurrence of this rare insect in England, which were, I think, satisfactorily met by confirmatory evidence of capture, this undoubted record of a capture in Ireland is of the highest interest. Mr. Campbell and myself have subsequently visited the locality in vain for other specimens.

HELIOTHIS PELTIGERA, *Schiff.*—I have met with a few specimens only, but it would not be safe to assume this as a criterion of scarcity, as very few southern localities have been tested, and those for the most part only during a hasty visit when yachting. Greystones, Co. Wicklow, one; Castlehaven and Crookhaven, Co. Cork, a few.

HELIOTHIS ARMIGERA, *Hb.*—Howth (*Holt*); Glengariff, Co. Kerry (*Meek*).

CHARICLEA UMBRA, *Hufn.*—Local and scarce. The specimens I have taken or examined are of the rich ruddy form. Birchall

records, "Howth and Co. Galway," where one has been taken since at Clonbrock (*R. E. D.*) ; Greystones, Co. Wicklow, scarce ; near Kenmare, Co. Kerry, a few ; Cappagh, Co. Waterford, one (*Miss V.*) ; Castle Bellingham, Co. Louth, one (*Thornhill*) ; Armagh ; and Sligo, one (*McC.*).

ERASTRIA FASCIANA, *L.*—A constant species, but variable in the marking of the reniform, which is sometimes filled in with white, but sometimes scarcely indicated by an outline. Apparently confined to Kerry, where it is in profusion near Killarney, Glenflesk, above Kenmare, near Headford, and about Loughs Cloonee and Inchiquin, &c.

BANKIA ARGENTULA, *Hb.*—This species, when fresh, presents no notable variation. The greenish colour is rather evanescent. Very abundant in spots among the Killarney bogs, as at Dinas and Garrymeen Bog, near Lord Brandon's cottage, and the lower slopes of Mangerton. Widely spread through Kerry, in similar localities as the last, but in more restricted areas, though stray specimens are met with throughout the neighbouring districts. The Hon. R. E. Dillon has discovered it also in Galway, at Clonbrock, and Mount Bellew.

HYDRELIA UNCULA, *Clerck.*—Locally distributed in many Irish counties, and not, as in the preceding two species, confined to the south and west. There is a slight variation in the breadth of the "unca" mark ; and in fresh specimens a pretty rosy tinge suffuses the fore wings, but is unfortunately evanescent. Abundant at Killarney and Kenmare, and in the same Kerry localities as the preceding. Occurs in Westmeath locally, at Cromlyn (*Mrs. B.*), and Killynon (*Miss R.*) ; Newcastle fens, Co. Wicklow, not rare ; Mount Talbot and Clonbrock (*R. E. D.*), and near Galway (*A.*). Common near Castle Bellingham, Co. Louth, where Mr. Thornhill met with a second brood on Aug. 1st, 1894, which was notable for a very hot summer.

PHYTOMETRA VIRIDARIA, *Clerck.*—Exhibits the usual wide range of colour variation in Ireland, where it is common and widely distributed.

EUCLIDIA MI, *Clerck.*—Variable both in the pale design and in colour. The pale lines and spots are sometimes yellowish, but generally whitish, and the ground colour is sometimes very dark fuscous-grey. Very widely distributed, but somewhat local, and often numerous.

EUCLIDIA GLYPHICA, *L.*—Curiously enough, I have rarely met with this generally common species in Ireland, except in Galway. It is locally abundant, but seems not generally distributed. I have no records from the north. In Galway it is pretty widely distributed, and probably will be found on the dry limestone

pastures of Clare. Near Clonbrock, and Castle Taylor, Merlin Park, &c., abundant. Also at Tullamore, King's Co.; at Cromlyn, Co. Westmeath (*Mrs. B.*), and Clondalkin, Co. Dublin (*Gr.*).

OPHIODES LUNARIS, *Schiff.*—Noticed as follows in Birchall's 'Catalogue':—"Two specimens captured at Killarney by the late P. Bouchard in 1864." But in the 'Supplementary Catalogue' of 1873 he includes *N. bicolora* and this species in the list of errata. There is no doubt in my mind of the authenticity of Bouchard's captures at Cromaglaun Glen. His character, according to the late Frederick Bond and other contemporaries, was above suspicion; and the subsequent captures of the former species has dispelled all doubts as to its being indigenous in Kerry. The Irish climate being in no way unsuitable to the latter insect, I have no hesitation in reinstating the record in the Irish list, more especially as I have been shown a specimen of the same by Mr. Dillon, taken by Lord Clonbrock's gamekeeper in his demesne in 1894.

CATOCALA FRAXINI, *L.*—One was captured at Kingstown in 1845 by the Rev. Joseph Greene, and is still in his cabinet at Clifton.

CATOCALA NUPTA, *L.*—Curiously enough this handsome and conspicuous moth has only been recorded as occurring in Ireland as follows. The late Dr. Robert Ball, sometime Curator of the Trinity College Natural History Museum, reported its capture by him to Mr. Birchall, but omitted to state the locality. Mr. Cuthbert, of Blackrock, also informs me that he saw a specimen on a tree at Blackhall, Co. Louth, a few years since, but refrained from taking it, as he only collected Coleoptera. There can be small possibility of an error of identification in the case of so large and conspicuous a moth.

(To be continued.)

SILK-PRODUCING LEPIDOPTERA.

BY ALFRED WAILLY.

(Membre Lauréat de la Société Nationale d'Acclimatation de France).

(Continued from p. 210.)

ANTHERÆA ROYLEI, Moore (Himalayan oak silkworm), a species closely allied to *A. pernyi*. The moths are of a lighter shade of colour than those of *pernyi*, and have a greenish tint. The principal difference between the two species is in the cocoon; that of *roylei* is white and covered by an irregular and hard envelope; the cocoon of *pernyi*, on the contrary, is of a light brown or buff colour, and it has no envelope. Moths emerging

from cocoons imported from India hatch for the most part in May or June, and some in the beginning of July. *Pernyi* and *roylei* moths pair together as if they were one and the same species; and it is the same with all closely allied species. The eggs are apparently identical, and so are the larvæ. The hatching of the eggs takes place after the same lapse of time, and the duration of the rearing is the same.

The crossing of the *roylei* with *pernyi* produces the remarkable and robust hybrid which I obtained in 1881, susceptible of reproduction and forming an intermediate type between the two parent species *roylei* and *pernyi*. *A. roylei* is found at Simla, Mussoori, Almorah, Darjeeling, and in Assam.

With respect to the *roylei-pernyi* hybrid I obtained in 1881, notices will be found in my reports on silk-producers for 1881 and 1882, which appeared in the 'Journal of the Society of Arts,' London. Specimens of moths and cocoons were exhibited and submitted to the Council of the Society of Arts on June 20th, 1882, after which an article on the subject was inserted in the Journal on Sept. 8th, by the editor, who had come previously, on my invitation, to examine the worms growing on the small oak trees in my garden in July. I very much regret, however, to have to record the extinction of my hybrid, in consequence of very bad weather, the destruction of worms by sparrows, and other causes, three years or more after the species had been obtained by me; but it never showed any sign of degeneracy. The stock of hybrid cocoons which had been obtained was by far too small to ensure a successful and lasting reproduction of this new species.

I shall now give the description of the hybrid by Mr. W. F. Kirby, as read by him at the meeting of the Entomological Society of London, on May 3rd, 1882:—

"Notes on a hybrid between *Antheræa pernyi*, Guér., and *A. roylei*, Moore.—M. Wailly, the well-known rearer of silkworm moths, has succeeded in obtaining hybrids between *Antheræa pernyi* and *A. roylei*, and has requested me to describe one of the moths. *A. pernyi* is the well-known oak-feeding silkworm of North China, and *A. roylei* is a North Indian species, also an oak-feeder. Hence they are not species occurring in the same locality in a state of nature. M. Wailly states, in a paper lately published in the 'Journal of the Society of Arts,' that the male *pernyi* paired readily with the female *roylei*, and that the hybrid larvæ (which he describes) proved much more easy to rear than those of *roylei*, with which he had but little success. The hybrid before me expands just six inches across the wings, which is about the size of large female examples of the two parent species. It is of a greenish buff colour, nearly as in the female of *roylei*, but much clearer, and with a distinct tawny shade, especially within the common band; the body and base of the

wings are also suffused with a distinct vinous shade more resembling *pernyi* than *roylei*; the shape of the wings also agrees better with *A. pernyi*. On the other hand, the eyes resemble those of *roylei*, but are considerably larger, the pupil especially being as large as in *pernyi*, but the projection of the black outer rim, so conspicuous in *pernyi*, is scarcely indicated. The other markings of the wings are well defined, and resemble those of *A. roylei*. On the under surface the insect agrees in colour and markings with typical *roylei*, but the basal band is less distinct and perhaps less waved, and the submarginal spots, dusted with white and pink, are larger and more distinct. Just inside there is a very faint dark stripe, more distinct on the right wing. In *roylei* this is still more indistinct, whereas in *pernyi* it is well marked, but closer to the spots. The antennæ and body of the hybrid are more like *A. pernyi* than *A. roylei*. The cocoon is fully as large as that of *roylei*, but instead of there being a considerable space between the outer and inner cocoon, there is scarcely any interval between them. *A. pernyi* has a similar but much smaller cocoon, and hence it would appear that that of the hybrid would be of greater commercial value than either.—W. F. KIRBY."

The following letter and description I received on Dec. 13th, 1882, from Mr. F. Moore, Curator of the Bethnal Green Museum, and formerly of the India Museum:—

"Dear Sir,—Enclosed is a description of the imagos of your hybrid *roylei-pernyi*, which I promised to send you. I was much interested on my visit to you in August, and was astonished to see with what facility the larvæ of the various silk-producers can be reared in the open air. Your larvæ of *cecropia*, *luna*, *selene*, *roylei*, and the hybrid *roylei-pernyi*, all appeared in a most healthy condition. They could not have been better had they been living in their native country.

"Description of the hybrid, *roylei-pernyi*.—The imago, in point of coloration, is intermediate between the two species. Both sexes of the hybrid show the mealy olivaceous colour of the pure *roylei*, dominated by a tinge of the ochraceous colours of *pernyi*; the ochraceous tinge, however, is brightest across the discal area of both wings within the transverse band, and more especially so in the female. The bands on both wings are more strongly developed than in *roylei*, and more so even than in *pernyi*; the ocelli in both sexes are larger than in either *roylei* or *pernyi*, the talcose central spot being much larger than in *roylei*, but about the same size as in *pernyi*. The ocellus on the hind wing differs from that of *roylei*, in having the upper curve somewhat extended upwards, thus giving it a slightly lobate form, as in some female specimens of *pernyi*. Both sexes of the hybrid are comparatively larger than the general size of *roylei*, and are much larger than *pernyi*.—F. MOORE."

ANTHERÆA MYLITTA (*Attacus mylitta*, Fabricius; *Attacus paphia*, Linné). This large and valuable silkworm, known also under the name of "tussah" or "tusser," is spread all over India and Ceylon. It is cultivated in Bengal, Assam, &c. It has a very extensive range, and may very likely be found in Burmah, Siam, Cochin-China, the Malay Peninsula, and the islands of the Indian Ocean.

The cocoons of the different races of *Antheræa mylitta* vary considerably in size, the largest coming from the Himalayas and other northern parts of India. The moths also vary considerably in size and colour. The *mylitta* cocoon is perfect in shape; it is smooth and without any floss; it is suspended to a small branch of the tree or shrub on which the larva has fed, by a strong silken cord, forming a ring around it.

In Europe this species has been bred on oak and hornbeam (*Carpinus betulus*). In India it lives on many trees and shrubs; among others, on *Terminalia tomentosa*, *Ziziphus jujuba*, *Lagerstræmia indica*, *Ficus benjamina*, *Carissa enidia*, &c.; it is also said to have been found on wild plum. The moths from cocoons imported from North India generally begin to emerge from the end of June, but it is in July and August that they emerge in numbers; they then continue to emerge till about the end of October. Moths will even emerge in the winter if the weather is mild. The cocoons may hibernate twice and even three times. In northern countries *mylitta* cannot be reared in the open air, owing to the formation of the cocoon, and the hatching of the larvæ taking place too late in the season. In Spain, where I introduced it in 1884, Mr. Segin, British Vice-Consul in Mahon, Minorca, succeeded in rearing, on oak trees in the open air, worms obtained from a pairing which had taken place on July 31st. The eggs hatched ten days after they were laid, and the larvæ began to spin on Sept. 29th. Worms from two other pairings which had taken place, one on Aug. 13th, the other on the 14th, all died in the middle of November, in consequence of a sudden and complete change of temperature, just at the moment they were going to spin.

ANTHERÆA ASSAMA (*A. assamensis*, Helfer). With the exception of the Dehra Doon, where it lives on a tree bearing the name of "kirkee," this species is only found in Assam, where, in the Assamese language, it is called "muga," which means "amber," on account of the colour of the cocoon. *A. assamensis* is cultivated in Assam on a large scale, and its silk is highly valued. In certain parts of Assam five generations are obtained. The sum (*Machilus odoratissima*) is the favourite food of this species; reared on it the worm produces, it is said, the finest and best silk. In Lower Assam it is reared on the sualu (*Tetranthera monopetala*). The foliage of certain species of forest trees, such as dighlati (*T. glauca*), bamroti (*Symplocos grandiflora*), and

patichanda (*Cinnamomum obtusifolium*), may also be used to feed the worms if the first two trees should be found wanting in the last stages.

During four consecutive years I received during the winter or in the spring large quantities of *A. assamensis* cocoons, but they never arrived in good condition. In 1889 over 400 were sent to me, all the moths having emerged during the voyage or died in the cocoon. Some of the moths had, however, emerged only a few days before the arrival of the boxes containing the cocoons, and this shows that it would be possible to receive the cocoons before the emergence of the moths, if they were sent in small boxes by sample post, going overland like the letters, instead of being sent by parcel post, which takes a fortnight longer.

To obviate this rapid emergence of the moths, my correspondent in Assam placed in the boxes *assamensis* larvæ which were just beginning to spin, thinking that by so doing about a week would be saved. The experiment was a complete failure, but it taught this lesson,—that larvæ cannot live, or change into pupæ that will live, when they are travelling; the shakings experienced by the larvæ when travelling prevent them from forming their cocoons properly, and also kill the larvæ or newly formed pupæ. Therefore I only found dead larvæ or dead pupæ in the cocoons.

ANTHERÆA FRITHII, Moore.—This is probably only a variety of *A. mylitta*. It is found in some parts of India, in Cochin-China, &c., and, according to Captain Hutton, at Darjeeling.

ANTHERÆA PERROTTETI, Guérin Méneville. Another race or variety of *A. mylitta*, discovered at Pondicherry by Mr. Perrottet.

ANTHERÆA HELFERI. Another species, the cocoon of which resembles that of *A. mylitta* (*Antheræa nebulosa*, Hutton). “A remarkable species, common in Central India, the silk of which can be compared to that of *A. mylitta*.”—Capt. Hutton.

BOMBYX (Theophila) HUTTONI, Westwood. “A bivoltine species, living in the mountains on the wild mulberry tree, at Simla, Mussoorie, and Almorah. *B. huttoni* is a robust species, producing a fine whitish cocoon. Although the *huttoni* worm is too wild to be bred in captivity, it would be a useful species for rearing in the open air on the mulberry tree itself.”—Capt. Hutton.

BOMBYX (Theophila) BENGALENSIS, Hutton. A polyvoltine species, resembling *B. huttoni*, but living in Bengal on *Artocarpus locucha*. “This species is smaller than the preceding one.”—Capt. Hutton.

BOMBYX AFFINIS. Discovered in 1869, at Chota Nagpore, by M. Kingi; it lives on *Artocarpus locucha*, but Capt. Hutton reared it with the greatest success on branche of *Morus indica*.

(To be continued.)

NEW EXPERIMENTS ON THE SEASONAL DIMORPHISM
OF LEPIDOPTERA.

BY DR. AUGUST WEISMANN.

(Translated from the German by W. E. NICHOLSON, F.E.S.)

(Concluded from p. 208.)

Furnished with this better information, let us turn to the observation of some other cases, which, I believe, we must consider as adaptive seasonal dimorphism.

Among these I reckon before all our *Pieridæ*, which are seasonally dimorphic, at least partially so. *Pieris napi*, the green-veined white, exhibits in its spring form the well-known broad blackish green powdering of the under side of the hind wings, which is obviously a protective colouring, and which, in fact, conceals the butterfly sitting asleep upon the leaves of plants just as well as the chequered green and white under side of the species of *Anthocharis*. But it is just this green protective colouring which is absent in the summer form, and the thought arises that the drier and less brilliantly green surroundings of the summer brood have made this alteration necessary. I well know that experienced entomologists, such as Seitz, have expressed the opinion that our whites enjoy immunity from birds, and would not be eaten by them. But in the first place the very accurate observations of Poulton and others are opposed to this view; and then with a butterfly asleep it is not a question of enemies among the birds, but of lizards, frogs, toads, and other enemies, whose importance in reference to butterfly-life is only very imperfectly understood. But this inadequate insight into the biology of the insects is just as true of the spring form, and with this the protective significance of the under side cannot be doubted. It is therefore certainly explained by the enemies of the butterfly at rest, whether we know them or not, and whether they still form a danger to the species or only did so in earlier times; as an old acquisition is only slowly lost, if it becomes unimportant.

Let us now see whether the results of the experiments agree with this view.

Besides my old experiments there are those of Merrifield on *Pieris napi*, and my own, which are here published, on *napi* and its var. *bryoniae*. Our results appear to be contradictory on one important point, since Merrifield believes he has found that the critical time for the determining influence of temperature is the last days of the pupal period, while it is obvious from my new Experiments I. and II. that the time immediately after pupation is the critical one. The majority of the pupæ of the first experiment, which were subjected to the summer temperature at this

time, produced the summer form, although cold may have acted upon them towards the end of the pupal period. On the other hand, in the second experiment pupæ of the same brood produced the winter form, when they were placed in the refrigerator immediately after pupation, and the result was not materially altered, if they were brought into the incubator three days before emergence.

I believe, however, that the contradiction between Merrifield's results and my own is only an apparent one, and that the reason is, that with *P. napi* adaptive and direct seasonal dimorphism are mixed. Theoretically this might be anticipated as not only possible, but probable. A species, which has adapted itself to the seasons of the year by a double protective colouring, can on this account be still directly alterable by heat or cold. And this appears to be the case with *P. napi*. Only the under side of the wing is really adaptive here, but differences between the winter and the summer form are also exhibited even on the upper side. The winter form possesses the black powdering of the bases of the wings, which is absent in the summer form; the winter form also exhibits a fine black powdering of the veins of the wings towards the margin of the wings, a character which is most strongly pronounced in the var. *bryoniæ*. But while the winter form has the apex of the fore wings only a dull grey, the summer form has here a more sharply defined and larger brownish black colouring.

A biological value can scarcely be attributed to these characters, and when it is seen that they run parallel to the action of a higher or a lower temperature on the pupæ, there is an inclination to regard them as the *direct* influence of the colour chemistry.

Should this view be correct, we must expect that circumstances might arise, which would result in a commingling of the characters of the winter form with those of the summer form; for example, winter form below and more or less summer form above. This would have to occur, if, for example, cold was prevalent at pupation until the primary constituents of the winter form—so far as they are adaptive and depend on special primary constituents—are rendered active, but then if later on, shortly before emergence, a high temperature was prevalent, and so influenced the chemistry of the formation of colour in the wing, that the other side had the summer habit.

It would be very simply explained in this way, how Merrifield came to assign the critical time to the end of the pupal period. He was right in so far as the character *directly* dependent upon temperature is actually first determined at this time, while the beginning of the pupal period gives the decision for the adaptive characters, which are contained in the germ-plasm as duplicated primary constituents.

It must for the present still remain doubtful whether this is actually the case; one of my experiments of 1872 *contradicts* it, since in this experiment pupæ of the first brood of the year of *P. napi*, which were placed on ice for three months, shortly after pupation produced 60 butterflies with *all* the characters of the winter form both on the upper and under side, although they had been transferred to a forcing-house on Oct. 3rd, where, in fact, these 60 butterflies emerged up to Oct. 20th.

One of Merrifield's experiments, on the other hand, is *in favour* of my view. Pupæ of the same second brood of 1892 were, as in my experiment, iced from three to four months, and then, when placed in a temperature of 27° C., produced eleven butterflies, which, indeed, exhibited the adaptive green powdering of the under side in the highest degree, but exhibited the characteristic features of the winter form less on the upper side, that is to say, those characters which, according to my view, might depend upon the *direct* influence of temperature. The contradiction in the results of our experiments on both sides may perhaps be explained by the fact, that in my experiment the temperature of the greenhouse, in which I induced the pupæ to emerge, might have been too low (no note was taken of it).

If we disregard the possibility of the co-operation of direct alterations by temperature, *Pieris napi* behaves just like *Vanessa proorsa-levana*. In the open only the winter form is seen in the spring, only the summer form in the summer and autumn; but this alternation of the form does not exactly correspond to the alternation of the brood, since generally in both broods a variable percentage does not develop forthwith ("subitan"), but remains latent during the following period of flight, and first emerges in the second period following. So far as I know, it has not been ascertained by experiment how large this percentage is, nor within what limits it fluctuates; I see, however, from a remark of Merrifield, that sometimes half of the first brood of the year do not emerge in the summer, but first emerge in the next spring, and in one of my old experiments with *napi*, in which all the individuals of a large brood of the summer generation did not emerge in the summer, but first emerged in the next spring, it has been quite rightly interpreted by Merrifield as a "congenital tendency" to hereditary hybernation. It happens from this, that, under circumstances, an entire brood can remain latent the following period of flight. Influenced by the thought that the direction of the development is largely determined by external influences, I had then sought for such an influence as the cause of the phenomenon, and I believed that I could find no other for this, as I believed, quite exceptional behaviour, than the mechanical shaking, to which the pupæ were subjected during a seven hours' railway journey. In the meantime Merrifield, not, indeed, with *napi*, but with other double-

brooded butterflies, occasionally saw the whole brood remain latent without any special influences; so it must here also be the result of internal causes. We shall therefore have to assume here, as with *Vanessa prorsa*, that it is not external influences alone, which decide which primary constituent is to become active, but that with a part of each brood from unknown internal causes a tendency to the activity of, it may be, the summer form, or, it may be, of the winter form, may be present from the beginning. But this tendency to the summer form is always connected with the tendency to immediate (subitaner)* development, the tendency to the winter form with delayed (latenter) development, *i. e.* if a pupa of the summer brood from wild specimens does not develop immediately, but hibernates, then it always produces the winter form, *although it is kept in warmth during the whole winter*. On the other hand, all pupæ of the second brood, in case they emerge the same autumn, produce instead the summer form; *Vanessa prorsa*, at least, behaves in this way. I have no experience with *Pieris napi* in reference to this point, and Merrifield's experiments† on it are not conclusive, as he placed only ten pupæ of the second brood immediately in a high temperature (32° C.), none of which happened to be forced, but all hibernated.

Now there might be an inclination at last to admit, that temperature had no influence in the determination of the form of the imago, and that all specimens of any brood, which assume the winter form, do so from an innate disposition; and the same with those which assume the summer form. But such a view would be refuted by the experiments. Rather the specimens of the summer brood, which are ready for immediate emergence, and at the same time for the activity of the summer form, can have their intentions altered by cold, and be induced to assume the winter form, although they do not hibernate, but emerge, as soon as they are taken from the ice into a warm temperature. They retain, therefore, their habit of immediate emergence, although they have been altered to the winter form. This is obvious, for example, from my Experiment 14 of 1872, in which the iced first brood, when placed in a forcing-house after three months, produced 60 butterflies of the winter form, while 34 did not emerge, but hibernated and produced the winter form in the next spring. Most of the 60 which developed immediately would in all probability have emerged under normal conditions in June

* This expression, which I first used in reference to the Daphnidæ, I have made bold to use here also, as the process is the same as there, only that there it is a question of the immediate (subitaner) or delayed (latent) development of eggs, but here of pupæ. Cf. Weismann, 'Beiträge zur Naturgeschichte der Daphniden,' Leipzig, 1876-1879.

† "Experiments on Temperature-Variation in Lepidoptera," in Proc. Ent. Soc. Lond. 1894, Part I., April.

as the summer form; the 34 which hybernated may, on the other hand, have been predisposed to delayed development (Latenz), and to the winter form.

Thus also a varying percentage of the second brood of the year may be induced by heat to assume the summer form, and to develop immediately; some will emerge in this form, even at the usual intermediate autumn temperature, but the greater number will incline to latency and to the winter form from the beginning in so strong a way, that they are no longer to be altered from it; but more accurate proof is still wanted on this point.

In my work of 1874, on seasonal dimorphism, I believed that I could decide, from the metabolism of a species in its different broods, which of the seasonal forms was the older and which the younger. From the observation, which is generally correct, that the brood of the summer generation in its principal part cannot be diverted from the *levana*-form by temperature, I then concluded, that this is the primary and that *prorsa* is the secondary form, since I regarded the artificial alteration as reversion to the parent form. Such, so I thought, could arise only with the younger and not with the older form. On the same ground, with *Pieris napi*, I considered the winter form the older. Although I still have the same view as to the relative age of these forms, yet I should now no longer rely on this conclusion, as, quite apart from the fact that with *V. levana* some specimens of the third brood emerge as the *prorsa*-form even in the late autumn, with a more mature insight into the processes of heredity, I cannot to-day any longer generally employ the conception of reversion in reference to seasonal dimorphism, as was explained above. Not that I consider it exactly incorrect to speak of reversion here, as a phyletically older form actually arises in this case; but it seems to me more convenient and more suitable for explaining the processes to limit the conception of reversion to those cases of recrudescence of an earlier living form, which do not follow in a regular cycle, that is to say, in a normal way. According to my proposition every reversion depends on the fact that a certain number of unaltered ancestral determinants are transmitted in the germ-plasm of a species, which under especially favourable circumstances (see 'Keim-plasma,' p. 392) occasionally become active, and can impress the resulting individual with ancestral characters. With adaptive seasonal dimorphism such an idea of ancestral ids in the germ-plasm is to be assumed, but not as a small vestige, rather in the same number as the modern ids of the other seasonal form. Its germ-plasm is conceived of as consisting of an equal number of winter ids and of summer ids, which usually alternate with each other in the course of ontogeny. This is not quite the same as the exceptional occurrence here and there of reversion to an

ancestral form on the concurrence of exceptionally favourable circumstances; it is a normal change between two germ-determinants, one of which is without doubt the older.

The origin of this alternation is not difficult to explain. With species, which, like *V. levana* and *P. napi*, were single-brooded during the glacial epoch, and were then subject to similar conditions of life as our present spring form, some of the ids of the germ-plasm, which in earlier times were homogeneous, have been gradually formed into summer ids, and at the same time the activity of these ids has been controlled by certain internal and external influences, which have resulted in the constant alternation of the two forms. The point is, that each of the two adaptive forms should arise at the right time, but not at a time and under external conditions, to which the protective colouring is not adapted. The facts teach us that this happened in a two-fold way: First, from the fact that the two kinds of ids are so arranged, that they alternately promote the ontogeny; in the first brood therefore the winter ids would be active, in the second brood the summer ids, in the third brood the winter ids again, &c. And secondly, from the fact that the activity of that kind of id, which is disposed to be active, can be hindered by certain external influences, heat or cold, and at the same time the opposite kind of ids can be induced to become active. It comes to this, that the internal disposition to activity, of whose nature we can obviously divine nothing, is not always connected with an alternation of the two kinds of ids, but that in a varying percentage of individuals of any brood the same ids are also disposed to be active in the following brood. But in this case, as a rule at least, the determination of the winter id is connected with the tendency to latency (hybernation), the determination of the summer id with the tendency to immediate development.

In this way the coincidence of both adaptive forms with the conditions of life appertaining to each seems to be best assured. Generally only two broods fly with us, and for this therefore the regular alternation of the two forms from internal causes is sufficient. Now it still remains to meet the possibility that by very unfavourable influences (bad weather, preponderance of enemies), such as constantly recur from time to time, though, indeed, but rarely, the permanence of the species in a certain area might be destroyed; and this happens here, as with many other species, from the fact that a percentage, varying in each brood, carries with it the predisposition to delayed development. But in the normal way this is connected with the disposition to activity on the part of the winter ids, since otherwise the summer adaptation might arise in the spring. In each brood, however, there are also individuals whose summer ids are disposed to be active, but these generally possess also the predisposition to immediate development; this applies to all specimens, which

assume the summer form at the ordinary temperature or even at an increased temperature, if they belong to the second or the third brood.

The fact that the summer ids may be induced to become active by a high temperature renders it possible for a numerous second brood of the summer form to occur in a very hot summer, as this, according to my old experiment already referred to, must be the case with *V. prorsa*, it probably is also the case with *P. napi*.

But, on the other hand, the fact that the winter ids may be induced to become active by cold provides the possibility that, if cold sets in early in the autumn, the third brood of the year should mostly hibernate, and then produce the spring form in the spring.

In spite of all these precautionary rules every specimen of a brood does not agree with the time of year, but the exceptions are rare; I do not know any case where a *prorsa* has been found in the woods in the spring or a *levana* in the summer; still intermediate forms (*porima*) occur in the summer, and I have already sought to explain them above. With *Pieris napi* a winter form or an intermediate form appears to have formerly occurred in the summer, but the differences here of the two forms are not so great or so sharp.

Theoretically the mixed forms can be easily understood from our standpoint: they depend on the fact that both determinants become active at the same time, and that consequently each of them seeks to take part in the colouring of the wings, so that sometimes the one and sometimes the other may preponderate. The same process arises, which according to my proposition takes place on the intermixing of the parents' characteristics in the child,* whereby, indeed, the *one* parent can make itself felt almost alone, and the other be entirely left out, but all conceivable combinations and intermixings of the characteristics of the parents can arise. In this case we know for certain that two separate predispositions come together on fertilization, and that consequently they are both together in the egg which is developing, while with adaptive seasonal dimorphism we only infer this from the phenomena of the change of garb.

If I now deny the correctness of my earlier conclusion as to the relative age of the alternating seasonal forms, I do not do so with *non-cyclic* species, as *Pieris napi* var. *bryoniae*. If it is true, as it appears to be from my earlier experiments, that *bryoniae* cannot be induced by heat to assume the *napi*-form, the conclusion would be probable, though not necessary, that *bryoniae* is the parent form of *napi*. Now this is not a case of *actual reversion*, i. e. of that sort which occurs exceptionally, which could

* Vid. in "Germ-plasm" the section on "The Struggle of the Ids in Ontogeny" (p. 260, Eng. trans.).

only happen if the white form had existed before the dark one, and if "white" ids, therefore, were usually still latent in the germ-plasm of *bryoniae*. As, however, in the new experiments with *bryoniae* here described there were isolated white specimens, a final decision must be suspended until further experiments have been made, as is stated above in the "results" of the experiments. Seitz is inclined to regard the *napi*-form as the primary one, since most of the species of *Pieris* are white; but it might be argued against this that the dark *bryoniae* occurs in widely removed regions of the earth,—in the Alps, the Jura, and the Polar Regions,—a range which points to a common circum-polar origin and subsequent separation after the close of the glacial epoch. Against this argument, indeed, the view might be held, that the black of the female *bryoniae* is an adaptation to a cold climate, in the sense of Lord Walsingham, which had been formed by selection independently in the Alps and in the far north. We do not get much further with the decision of the particular question, but perhaps from its profitable discussion we see afresh, how little we know of the biology of insects, and how difficult it is to obtain a true solution of particular questions.

Now if, as I think is unavoidable, *direct seasonal dimorphism* is distinguished from *adaptive*, the question is, which of the known cases belongs to the one, and which to the other category. But in order to decide this, more accurate researches especially directed to this point are necessary, as they are not yet available. In cases in which double marking and colouring occur, which are evidently protective, as in the tropical Satyridæ bred by de Nicéville and *Junonia almana-asterie* described by Seitz as seasonally dimorphic, seasonal dimorphism can with greater safety be referred in anticipation to the processes of selection. Apparently *Grapta interrogationis* also, with its two seasonal forms var. *fabricii* and var. *umbrosa*, investigated by W. H. Edwards, is to be referred to double protective adaptation, since in this case the protective under side exhibits great differences. But, on the one hand, considerable differences are present on the upper side; and on the other, it is yet to be proved in what way the protective under side of the summer form is a better protection during the summer time, than the under side of the autumn and spring forms, and *vice versâ*. The under side of the species of *Grapta* is always to a high degree protective, but it is very different in the different species, and with many of them also appears to alter according to the time of year. I often thought that I had found a seasonal dimorphism of the under side in our *Grapta c-album*, but the matter has not been followed up sufficiently closely to enable us to exclude other explanations of the variability observed, especially individual and local differences. I consider it, however, very possible that an adaptive seasonal dimorphism of the under side will yet be found. A. Seitz

has already pointed to *G. c-aureum* from Japan as an example of this. According to Edwards, in *G. interrogationis* the summer brood in Virginia has a muddy yellow under side with a complicated pattern of marking, but the autumn and spring butterflies have the brownish red of a dry leaf, and as a principal marking the bent midrib of a leaf.

So it may be supposed that with our Pieridæ with protective under sides, so far as they possess a seasonal dimorphism, they owe it to the adaptation to the finely pinnate leaves, especially to the foliage of various plants (Cruciferae, Umbelliferae) on which the butterfly is wont to rest. It would be interesting to observe one of these species, e.g. *Anthocharis belia-ansonis*, in its habits of life, in order to unravel the question, whether a greater similarity to the resting plant of each season does not produce the variations in the green and white pattern of the under side, which are not altogether insignificant.

Such cases would only be explained by a double process of selection, which in the first brood rejects those specimens which during the summer guarantee less protection to the resting butterfly; and in the second, those which guarantee less protection in the autumn or spring. This process of selection must always have been double; moreover, if a single-brooded species, which already possesses adaptive colouring, is induced by a warmer climate to interpolate a second brood, then in this case the necessity of the adaptation of the second brood of butterflies to the altered environment of the later summer will first, indeed, have chosen out only the individuals of this second brood itself, but very soon the hereditary transmission of the newly assumed characters of the second brood will have made itself felt on the first brood, and rendered necessary a rejection of the individuals possessing them. A double adaptation can only be realised and retained by continual sifting of both broods, and, as it appears to me at least, this has only become possible under the further hypothesis that several ids* (anlagen) of the wings and of the whole insect are contained in the germ-plasm of each individual, from which some can be reared in this direction, and others in that, while at the same time they are adapted to different excitants which give them scope for action,—heat, cold, &c.

In cases of pronounced double adaptation of a protective nature, we may safely infer such an origin of seasonal dimorphism; but with butterflies seasonal dimorphism is not confined to the under side, but accompanying these differences, which are certainly protective, there are also some on the upper side. With *Vanessa levana-prorsa* this is the other way about, i.e. the upper side is more strongly variable than the protective under side. On the latter there is in *levana* a large washed-out lilac spot,

* Cf. note on p. 205, where 'anlagen' is used as synonymous with 'determinant.'—Translator.

which is either entirely absent in *prorsa*, or at least is slightly indicated on the hind wings only; on the other hand, *prorsa* exhibits the white band below, which is covered with yellowish and brownish tones in *levana*. *V. levana*, therefore, at any rate while at rest, is well adapted to the numerous dry leaves of the spring wood; I do not know, however, whether they rest on the ground. *V. prorsa*, indeed, spends the night on plants—brambles, danewort (*Sambucus ebulus*), and the like—and is well protected by this very white band, which is also visible when it is at rest, in the neighbourhood of white flowers.

Although the upper side of most butterflies has no sympathetic colouring, still I will in no way dispute that such may occur in quite a general sense, and even the *levana*-form may to some extent be protected in flight by its agreement in colour with the yellowish-brown dry leaves of the spring wood. But generally protective colouring of the upper side will arise as mimicry.

Although I have considered *prorsa* under this point of view, I should still expect that cases of mimicry would be rarely connected with seasonal dimorphism. It is not, indeed, impossible, but improbable, that any tropical species has mimicked one of the protected species for the rainy season, and another protected form for the dry season. It is the case that a species requiring protection has adapted itself to a different protected Danaid in Ceylon than in Malacca and in Java; examples are also known where the male resembles a different protected type from the female, but hitherto, at least, it has not been observed that *periodic* dimorphism occurs in a species with double mimicry.

It is still more difficult to decide whether we have to do with pure *direct seasonal* dimorphism in any particular case. The experiments justify its assumption with *Chrysophanus phloas*; and with *Pararge egeria* and *Vanessa urticae* the climatic variations may well be regarded as the direct effects of the different temperatures; but it is difficult to decide whether, and, if so, how far, double adaptation takes part in this or—with climatic variations—sexual selection. When, for example, Merrifield* finds with a Geometer, *Selenia illustraria*, that low temperature applied to the pupæ impresses the perfect insect with the dark winter form, and high temperature the bright summer form, this might be well regarded as the direct effect of temperature. But when one considers that the actual cause of the variability of both broods might possibly be an adaptation of the upper side of the moth to the different surfaces, on which it sits in the spring and in the summer, the possibility remains that processes of selection and not temperature have produced them.

* Merrifield, "Systematic Temperature Experiments on some Lepidoptera in all their Stages," in Trans. Ent. Soc. Lond. 1890, p. 131.

But now Merrifield,* with another Geometer with a leaf-like cut to its wings, *Ennomos autumnaria*, could in like manner produce a darkening of the upper side of the ochreous moth by cold, although it has only one brood in England, and also in Germany. It looks as if this must still be the direct effect of cold; still we cannot maintain this without going further into the matter. It might be reversion to a more darkly coloured parent form. The remarkable alterations have already been above referred to in passing, which Dorfmeister, Merrifield, and Standfuss obtained in butterflies by the application of ice or of great heat to their pupæ, and it was then noted, that Dr. Dixey considered the majority of these aberrations as reversions to earlier forms, and that for particular cases, at any rate, he has made this very probable. But this can scarcely apply to all, and some of these alterations of colour may well be regarded as the direct influence of temperature on the colour-chemistry of the wings.

Now my experiments with the Neapolitan *Chrysophanus phloæas* prove that such temperatures as create alterations slowly influence the germ-plasm also, and thereby enable the alteration to become hereditary; so these direct alterations of colour by the climate cannot well be entirely without significance, although they certainly have less significance for the metamorphism of the species of Lepidoptera, than I formerly ascribed to them before the recognition that a large part of seasonal dimorphism must depend upon selection.

Perhaps the future will place us in the position of being able from the critical period of the effect of temperature to draw inferences as to the nature of the alteration. Should the view given by me above be confirmed, and the observations which at present stand opposed to it be explained in another way, we should be in such a position; but at present the facts are not yet sufficient for it. The very carefully carried out experiments of Merrifield above referred to do not yet afford any safe conclusion on the question, whether the critical time for the coming into activity of *one* of the two double-determinants always lies in the beginning of the pupal period, and whether alterations of colour, which in the end proceed from the influences of temperature, are always to be regarded as direct alterations of the colour-chemistry.

With *Selenia illustraria* the pupæ of the summer brood, which were iced immediately, produced winter form with dark colouring and marking; pupæ of the same brood, which were iced for twelve weeks and then forced at 27° C., produced a much brighter moth with rather dark marking.

Merrifield concludes from this, that the critical time for the

* Merrifield, "Conspicuous Effects on the Markings and Colouring of Lepidoptera caused by Exposure of the Pupæ to different Temperature-Conditions," Trans. Ent. Soc. Lond. 1891, p. 155.

marking is the beginning of the pupal period, but for the ground colour the end of it. Now the "marking" is only something separated from the "ground colour" in our ideas; as a matter of fact it is not here, as in a picture, where there is first the drawing and then the colour is laid on it; but what we call "marking" is only another stripe of colour of the one layer of coloured scales, which determines the colouring of the wing. "Marking" therefore is genetically the same as "colouring," and biologically also, in so far as they work together for a sympathetic or striking colouring. I will not, however, deny that under certain circumstances colourings may appear, which are actually of different origin from the pattern of colour originated in the germ-plasm: I see, for example, such a case in the black powdering of the southern form of *Chrysophanus phleas*, the var. *eleus*; but if the surface of the wings is sympathetically coloured, as is certainly the case with this *Selenia*, then the whole pattern of colour is already contained in the germ by natural selection, and makes up the biological value of the colouring. To which it may be added that with *Selenia illustraria* the marking of the summer form is exactly the same as that of the winter form, only much fainter, and to some extent almost or entirely washed out; it is nothing quite new as with *Vanessa prorsa*, as opposed to *levana*. On this account the changes of colour observed by Merrifield would perhaps be more appropriately explained by the fact that the determinant of the winter form is set free by cold, but that the summer temperature following later on enables the summer determinant also to become active, and that the two determinants now work together and produce an intermediate form. But this would be a contradiction of my view that the beginning of the pupal period is actually the critical moment for the double determinants contained in the germ. The questions here stated can only be answered by further experiments definitely directed to this point on as many species as possible.

We may now at any rate go so far as to say, that the temperature *before* pupation has no influence on the colour and marking of the perfect insect. My experiments with *phleas* already pointed to this, in so far as in this case the larvæ which hatched from Neapolitan eggs produced very different butterflies, although the pupæ only had been subjected to different temperatures, but the larvæ were all treated exactly alike. Merrifield has shown for *Ennomos autumnaria*, that the very different temperatures in which the larvæ may be reared are without influence on the colouring of the perfect insect. Therefore although, as we have recently learnt, the form of the wings of the imago is outlined very early in the larva,* yet the decision as to which of

* E. Verson, 'La formazione delle ali nella larva del *Bombyx mori*,' Padova, 1890; and J. Gonin, 'Recherches sur la métamorphose des Lépidoptères,' Lausanne, 1894.

two wing-determinants of an adaptively seasonally dimorphic species shall become active, is, at the earliest, given at the beginning of the pupal period.

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

BY ARTHUR G. BUTLER, Ph.D., F.L.S., &c.

(Continued from vol. xxviii. p. 276.)

TRIGONIA, *Guen.* = CLATERNA, *Walk.*

Claterna, Walk., Cat. xv. p. 1543, is synonymous with this genus, the type being very closely allied to *T. cydonia*, Cram.; it is significant of the value of the family characters recognized by Messrs. Guenée and Walker, that *Trigonia* is placed in the Platydidæ, and *Claterna* in the Focillidæ. *Trigonia* being preoccupied in Mollusca (1791), *Claterna* will stand.

The following genus probably belongs to the Thermesiidæ; if, as I believe, I have rightly made out the affinities of the typical species, *R. curvicosta*.

RENODES, *Guen.*

Renodes sigillata.

Thermesia sigillata, Walker, Lep. Het. xv. p. 1562, n. 4 (1858).

T. credibilis, Walker, l. c., p. 1565, n. 8 (1858).

Poaphila profecta, Walker, l. c., p. 1836 (1858).

St. Domingo. Types in Coll. B. M.

EPISPARIS, *Walk.*

Neviasca and *Pradiota*, Walk.

Walker described *Episparis* as a Trifid Noctuid of the family Orthosiidæ, *Neviasca* as a Deltoid of the family Platydiidæ, and *Pradiota* as a Geometrid of the family Macariidæ; and he described the same species in each of these widely separated families.

Episparis varialis.

Neviasca varialis, Walker, Lep. Het. xvi. p. 7, n. 1 (1858).

Episparis signata, Walker, l. c., Suppl. 3, p. 1032 (1865).

Pradiota sejunctata, Walker, l. c., 5, p. 1572 (1866).

Episparis exprimens, Walker, Trans. Ent. Soc., 3rd ser., vol. i. p. 106 (1862-3).

India, Ceylon, Java, Borneo. Types in Coll. B. M.

This is merely an oriental form of the African *E. penetrata*; the latter varies more, but probably is rather dimorphic than variable; the eastern type has the dark marginal crescent edged internally with white.

AMPHIGONIA, *Guen.*Focilla (part) *Guen.**Amphigonia recurva.*

Focilla recurva, Walker, Lep. Het. xv. p. 1530, n. 5 (1858).

F. consurgens, Walker, *l. c.*, p. 1531, n. 6 (1858).

Espíritu Sancto, Western Coast of America, Venezuela. Types in Coll. B. M.

Walker's so-called variety of his *F. recurva* is simply the male. The species is nearly allied to *A. centurialis* of Hübner (Zutr. figs. 295, 296).

M. Guenée says of his genus *Amphigonia* that it is based upon three species, which he has not been able to examine at the same time. Probably, if he had, it would have struck him that several of his species of *Focilla* (placed in the preceding family Focillidæ) were congeneric with *Amphigonia*, and that there was no family distinction between the types of the two genera.

EPHYRODES, *Guen.*

Liviana, *Leida* and *Maltana*, Walker; *Zethes* and *Ephyrodes* (part), Walker.

Ephyrodes cacata.

Ephyrodes cacata, Guenée, Noct. 3, p. 366, n. 1844 (1852).

E. omicron, Guenée, *l. c.*, n. 1845 (1852).

Zethes quatiens, Walker, Lep. Het. xv. p. 1523, n. 2 (1858).

Ephyrodes implens, Walker, *l. c.*, p. 1588, n. 3 (1858).

E. exprimens, Walker, *l. c.*, p. 1589, n. 4 (1858).

E. jurgiosa, Walker, *l. c.*, p. 1590, n. 5 (1858).

E. scitilinea, Walker, *l. c.*, n. 6 (1858).

E. comprimens, Walker, *l. c.*, p. 1591, n. 7 (1858).

Liviana pallescens, Walker, *l. c.*, Suppl. 3, p. 1035 (1865).

Leida pallida, Walker, *l. c.*, p. 1036 (1865).

Maltana thermisioides, Walker, *l. c.*, 5, p. 1975 (1866).

Parà, Bahia, Venezuela, St. Domingo, Chiriqui. In Coll. B. M.

GALAPHA, *Walk.**Thyridospila*, Walk. (not Guen.).

That this is not M. Guenée's genus is evident, for he says that, in *Thyridospila*, the thorax is narrow, the abdomen long and extending beyond the lower wings, flexuous at the extremity, terminated by a tuft of bifid hairs, which conceal two little smooth and recurved hooks (which remind one somewhat of those of the *Forficula*); the intermediate tibiæ cleft, and bearing a silky membrane covered with scales. The secondaries of the sole species are also said to have two angles. None of the above characters are found in the *Thyridospila* of Walker, one of the species of which genus appears to be Guenée's *Amphigonia isoa*.

The genus *Galapha* will now contain *Hypernaria sublineata*, Walk., *Galapha antecessens*, Walk., *Thyridospila rubricosa*, Walk., *Amphigonis isoa*, Guen., = *Thyridospila turbulenta*, Walk., *Thyridospila ustipennis*, Walk., and *Focilla intacta*, Felder.

Galapha antecessens.

Galapha antecessens, Walker, Lep. Het. xv. p. 1544, n. 1 (1858).

Focilla facunda, Felder, Reise der Nov. Lep. 4, pl. cxviii. fig. 21.

Ega and Espiritu Sancto. Type in Coll. B. M.

I strongly suspect that this is no more than a variety of *G. sublineata*, with which it closely agrees in pattern, though more brilliant in colouring; in the same way, in all probability, *Focilla intacta* of Felder will prove to be a dull form of *F. rubricosa*, Walk.

Galapha isoa.

Amphigonis isoa, Guenée, Noct. 3, p. 338, n. 1804 (1852).

Thyridospila turbulenta, Walker, Lep. Het. xv. p. 1527, n. 2 (1858).

Focilla epulea, Felder (? Herrich-Schäffer), Reise der Nov. Lep. 4, pl. cxviii. fig. 24.

Villa Nova, Ega, and Tapajos (*Bates*). In Coll. B. M.

The form of Herrich-Schäffer's figure differs from, and the markings of the secondaries especially do not correspond with, that of Felder.

The following genera associated under his family Bendidæ by Guenée must be considered here, the genus *Bendis* itself being allied to *Galapha* :—

ITONIA, Hüb. (not Guen.).

Itonia lignaris.

Itonia lignaris, Hübner, Exot. Schmett. Zutr. figs. 317, 318.

I. opistographa, Walker (not Guenée), Lep. Het. xiv. p. 1338, n. 1 (1857).

Var. ? *I. intrahens*, Walker, l. c., xv. p. 1822 (1858).

Venezuela, Honduras, and Sta. Martha. In Coll. B. M.

PSEUDOBENDIS, n. gen.

Itonia, Guenée (not Hüb.).

Structurally this genus is very close to *Remigia*, the woolly under surface of the wings and broadly-fringed legs being very similar; it differs however considerably in pattern (especially on the secondaries), the angulation of which and the ciliation of its antennæ readily distinguish it. In every detail, excepting the woolly clothing of the wings, it still more nearly corresponds with *Hulodes*, next to which it should stand.

Pseudobendis opistographa.

Itonia opistographa, Guenée, Noct. 3, p. 212, n. 1614, pl. 23, fig. 4 (1852).

I. multilinea, Walker, Lep. Het. xv. p. 1823 (1858).

Honduras. In Coll. B. M.

The true *Itonia*, Hübn., in which the secondaries are not angulated (though obtusely subangulated), has naked legs, and no woolly clothing to the under surface of the wings.

*Bendis, Hübn.**Bendis formularis.*

♂ *Bendis formularis*, Hübner, Exot. Schmett. Zutr. figs. 903, 904.

♂, ♀ *B. impar*, Guenée, Noct. 3, p. 217, n. 1624 (1852).

♀ *B. poaphiloides*, Walker (not Guenée), Lep. Het. xiv. p. 1341 (1857).

♂ *B. fusifascia*, Walker, l. c., xv. p. 1823 (1858).

♀ *Ephyrodes postica*, Walker, l. c., Suppl. 3, p. 1071 (1865).

St. Domingo, Honduras, St. Vincent, Trinidad, Jamaica. In Coll. B. M.

Felder has incorrectly figured a worn example of the female (Reise der Nov. Lep. 4, pl. cxix. fig. 16) as *B. irregularis*. As M. Guenée points out, the latter has an oblique orange-margined blackish stripe through both anterior and posterior wings.

Bendis irregularis.

Bendis irregularis, Hübner, Samml. Eur. Schmett. Noct. fig. 361.

Zethes umbrata, Walker, Lep. Het. Suppl. 3, p. 1024 (1865).

— ? In Coll. B. M.

Bendis pelidnalis.

♀ *Lesmone pelidnalis*, Hübner, Exot. Schmett. Zutr. figs. 169, 170.

♂ *Bendis angina*, Guenée, Noct. 3, p. 215, n. 1619 (1852).

Ophiusa undulifera, Walker, Lep. Het. Suppl. 3, p. 970 (1865).

♀ *Thermesia illiturationa*, Walker, l. c., p. 1064 (1865).

— ? (*Milne Coll.*) In Coll. B. M.

It is probable that our examples of the two preceding species were obtained from Surinam, but it is impossible to trace their origin. They are very old specimens, and may have formed part of Drury's collection originally.

Bendis poaphiloides of Guenée appears to me to be Walker's *Thermesia glaucescens*, which is only a small form of his *T. suffusa* = *T. cinctifera*. I have referred the species to the genus *Argidia*, but our examples are all females, and therefore it is possible that I may be wrong. In any case I do not believe the

species to be a *Bendis*, the unangulated wings and almost central character of the transverse stripe not being at all characteristic of this genus.

Bendis pangonia of Guenée is, without question, identical with Walker's *Naxia calorifica*, the type of the genus *Delgamma*. The locality, "Brazil?", is of course incorrect, as it is an Indian species; but Guenée says:—"Je ne suis pas bien sûr de la patrie de cet insecte, et il pourrait se faire aussi qu'il n'appartient pas à ce genre."

Bendis limonia is included by Herr Moeschler in his account of a collection received from Jamaica. The description of M. Guenée seems to point to a species of *Orthogramma*, allied to *O. lurida*:—"Cuisses antérieures munies d'un faisceau de poils jaunâtres et d'un autre faisceau d'un brun-noir luisant." Cayenne is given as the locality; but M. Guenée says that he received two specimens from M. Feisthamel,—one marked with "Cayenne," and the other "India."

Bendis magdalia can hardly belong to the genus, the wings being entire, with the transverse band on the secondaries central. *B. ellops* may be allied to *B. pelidnalis*, but I strongly suspect it to be an *Orthogramma*.

Bendis hinna.

Acolasia hinna, Hübner, Exot. Schmett. Zutr. figs. 971, 972.

Bendis gurda, Guenée, Noct. 3, p. 216, n. 1623 (1852).

Poaphila pulverosa, Walker, Lep. Het. Suppl. 3, p. 994 (1865).

P. cinerea, Butler, P. Z. S. 1878, p. 488, n. 101.

Texas, Jamaica. In Coll. B. M.

M. Guenée gives the Isle of St. Thomas as the locality of his *B. gurda*; and Walker was unable to give the locality of his *Poaphila pulverosa*, which was one of the old specimens from Milne's collection. I have only seen females of *B. hinna*, which greatly resemble *Poaphila*, excepting that the primaries are subangulated. Near to it in the Museum collection I found Walker's *Poaphila perspicua* (another species the locality of which was unknown); it is certainly Grote's *Phurys glans*, which it will supersede.

Bendis detrahens.

Poaphila? detrahens, Walker, Lep. Het. xv. p. 1834 (1858).

Trama arrosa, Harvey, Bull. Buff. Soc. 3, p. 13 (1875).

E. Florida, Texas, and Kansas. Types in Coll. B. M.

This is such a typical-looking *Bendis*, that even if the name *Trama* were not preoccupied in Hemiptera there could be no object in adopting it.

The genus *Pleonectyptera* appears to be a *Thermesiid*. *P. geometralis*, Grote, is = *Poaphila irrecta*, Walk.; and (speaking of *Poaphila*) *Poaphila contacta* and *P. subordinata* of Walker must be added to the synonymy of *Panula inconstans*, Guen.

Poaphila? paucula, Walk., seems nearly allied to *Pleonectyptera phalænalis*, Grote, though a perfectly distinct species.

The genus *Milyus*, Wlk., will supersede his *Chabora*; the typical species *M. mixtura* comes (not from Africa as stated by Walker) from Jamaica, and is the male of *Azeta uncas*; *Azeta* will take priority over both genera.

Walker described a genus *Corna*, and placed it in the Poaphilidæ; the type species *C. inconspicua* he subsequently described (p. 1089) as *Hypernaria? tenebrosa*. This genus belongs to the Trifidæ, and is nearly allied to *Stellidia*, Guenée, originally described as a genus of Geometrites, of the family Boletobidæ. *Capnodes cinerea*, Butler, from Japan, must be referred to *Stellidia*.

(To be continued.)

NOTES AND OBSERVATIONS.

THE LIGHT FORM OF VANESSA C-ALBUM.—I have just taken some more of the light form of this species in Shropshire. As no name appears to have been given this very distinctive seasonally dimorphic form of *V. c-album*,—which occurs as the type of the first generation upon the Continent, but only as an aberration of the same brood in this country,—I beg to propose the name *lutescens* for it.—W. HARCOURT-BATH; June 29th, 1896.

ANOTHER USE FOR NAPHTHALIN.—When my insects revive after they are set, instead of dropping a little chloroform on them, which sometimes spoils the appearance of the specimen, I cover them with naphthalin, which soon kills and leaves no other trace behind. As the “emeralds” will not stand the vapour of ammonia, I stupify them in the cyanide-bottle sufficiently to set them, then cover them with naphthalin, and in a short time they are dead.—F. HILTON; 184, Stamford Hill, N.

EUCHLOË CARDAMINES AT REST.—On June 21st, near Esher, I came across a specimen of *Euchloë cardamines* at rest on the uncurling tip of a bracken frond, where it was well protected by resemblance, the mottled under surface of the hind wing harmonising wonderfully well with the green knobs of the unfolding fern covered with whitish down. One could almost fancy that this position was assumed after deliberate thought; but I suppose the fact is rather that the peculiar markings on the under surface of the hind wings harmonise with many plants whose foliage is finely divided, just as they do with the blossoms of some of the Umbelliferæ.—W. J. LUCAS; Knight's Park, Kingston-on-Thames.

DRAGONFLIES CAUGHT BY DROSERA.—On June 27th, at the Black Pond, near Esher, Surrey, I noticed several small dragonflies caught by the *Drosera*, which was in fine condition. On one plant of *D. rotundifolia* there were no fewer than four dragonflies, three living

males of *Enallagma cyathigerum*, and one dead female, no doubt of the same species.—W. J. LUCAS; Knight's Park, Kingston-on-Thames.

NOTE ON THE EARLY STAGES OF THE LARVA OF *POLIA CHI*.—There is a curious point in the development of the larva of *P. chi* not mentioned in Newman or Stainton, neither does Mr. Arkle mention it in his note on the breeding of this species and its variety *olivacea* (Entom. xxix. 61), *i. e.* the larva, when newly hatched, has only the two posterior pairs of ventral claspers developed, the second pair being indicated by two small papillæ, only visible under a powerful lens; the anterior pair not visible at all. The young larva loops like a geometer. After the first moult, the second pair of claspers are more fully developed, but are destitute of hooklets, and are not used in walking; the anterior pair only just visible. It is not till after the third moult that the second pair are fully developed and used in walking, the anterior pair not being developed till a moult later, and are, even then, smaller than the three other pairs, and, as often as not, are not used in walking, neither are they used in grasping the food-plant when the larva is at rest. These observations were made on the larvæ from ova laid by a female var. *olivacea*.—N. F. SEARANCEKE; Mitcheldean, June 16th, 1896.

A HYMENOPTEROUS PARASITE.—About the middle of April this year, at Bidarray in the Lower Pyrenees, I found, under a stone near a river, a cocoon of a species of Lepidoptera unknown to me, of an inch long and half an inch in diameter; the pupa-case, a brown, hard, smooth, slightly curved cylinder, bearing no trace of segmentation or form of imago. I placed it in a tin box; on opening this on May 10th some five or six hymenopterous insects were found crawling about, some took flight, but a specimen or so were captured. On examination of the pupa-case it was observed that at either end was a small aperture gnawed; on opening the case the lepidopterous imago, withered and dry, was found to occupy a bare fourth of the space, the remainder being filled with a colony of twelve hexagonal cells, four in the centre, eight surrounding them, like a piece of honeycomb made of yellow silk. Sharp, in his work on "Insects" (Cambridge Nat. Hist.), mentions a Brazilian sawfly which constructs its nest on the bee comb system, protecting the whole with a thick outer wall. In this instance the protective wall was built by the larva of a lepidopteron, whose larval parasites constructed within it, in accordance with the instincts of their order, pupa-cells of the form best suited to the economy of space in their cramped situation. A female imago of this hymenopteron measured three-eighths of an inch, the ovipositor adding another eighth of an inch. The head and thorax were black. Abdomen orange, darkening to black, and ending in a white spot just above the ovipositor. The first pair of legs was inserted far forward on the thorax, the other two pairs close together far back; the hind pair was the longest. The wings were four. A male specimen was coloured similarly, but measured an eighth of an inch less, and was more miniature in all his parts. Under the microscope the legs showed the divided trochanter of the sub-order Hymenoptera Parasitica, and the venation of the wings proved to be that of the family Ichneumonidæ. The antennæ long, reaching to tip of wings, black, with a bar of white

in the middle, consisting of thirty-three joints, more closely compacted nearer the extremities. Legs with divided trochanters, tibiæ furnished with a long hook, tarsi five-jointed, the last joint furnished with two hooks. Ovipositor length of abdomen, consisting of three pieces, the centre a smooth, hard, sharp-pointed borer, the outer sheath of two pieces softer and hairy. The whole insect was hairy. The position of the ovipositor in an incomplete female in one of the cells struck me as curious, being curled over and laid along the back of the abdomen.—ROSE HAIG THOMAS; The White House, Basildon, Reading, July 3rd, 1896.

LARVA OF DICRANURA VINULA AND ITS WEAPON OF OFFENCE.—On July 2nd I found three full-fed larvæ of *Dicranura vinula*, on a willow tree, which I took home with me. The next day, on my looking into their cage to see if their leaves wanted changing, one of the larvæ suddenly squirted up a quantity of poisonous fluid with great force into my right eye. In the most intense agony I rushed off to the doctor, who pronounced the eye-ball to be in a dangerous condition, and said that the poison must have been of a most virulent nature. For some hours I could not see at all with the injured eye, and it was some days before it had recovered. At the time of this extraordinary occurrence my eye was quite *two feet* away from the caterpillar, thus showing the great force it must have used. I have bred hundreds of these larvæ before, and examined them closely in all their stages, but have never noticed this peculiarity before; though, of course, many kinds of larvæ slowly emit a greenish fluid when irritated. Can any of your readers tell me of similar instances of this extraordinary propelling force in any larvæ? Could the larva have shot from its mouth, or from the red filaments in its two tails? It certainly made a wonderfully good shot!—H. W. SHEPHEARD-WALWYN; Glensyde, Bidborough, near Tunbridge Wells.

[The fluid which caused the unpleasant effect was formic acid, and it was ejected by the larva from an orifice placed on the under side of the segment immediately following the head. When at rest, the head itself is withdrawn into the first thoracic segment, and the opening referred to is then in position, and ready to discharge the irritating fluid. Possibly, however, the larva only uses this means of defence under exceptional circumstances.—ED.]

THE LATE MR. J. A. COOPER'S SALE.—Another collection, that of the late Mr. J. A. Cooper, of Leytonstone, has recently been broken up at Stevens's, and considering the time of the year, and the fact that it contained few rarities or varieties, the total of £146 12s. 6d. realised may be considered satisfactory, notwithstanding the inclusion in that figure of two cabinets. Practically the only variety of any note was the fine var. of *Polyommatus phlæas* figured in the 'Entomologist' for last June, which made £2 10s. Twenty-three specimens of *Deilephila galii*, all bred by Mr. Cooper from larvæ found by himself at Aldeburgh, Suffolk, in the well known *galii* year, fetched an average of about 4/6 each. A specimen of *Sphinx pinastri*, well authenticated (but with no history in the catalogue), realised 32/6. Thirteen *Nola centonalis* went for £2 7s.; and a lot of *Arctias*, including a confluent var. of *A. villica* (once belonging to the writer), 28/-. The cheapest lots in the sale

were probably two series of vars. of *Arctia caia*, the first including three with golden yellow hind wings, and a fine dusky specimen not specifically mentioned in the catalogue, realised 37/6; the second, a somewhat similar lot, but not quite so strongly marked, 21/-. *Lalia cænosa* went for 5/6 each. A lot of eight *Acronycta strigosa*, with four *A. auricoma* and others, 22/-. It was surprising to see a well-known dealer buying *Pachnobia alpina* at a shade over 3/6 each; whilst eleven specimens of *Toxocampa cracca*, with sixty-seven other insects, only fetched 6/- the lot. An asymmetrical male *Angerona prunaria*, with a long series of pretty but not particularly striking forms, fetched 45/-; and a fine dark *Abraxas grossulariata* 50/-. The two cabinets sold very well, a 40-drawer Gurney £27 6s., and a 36-drawer Brady £16 16s. I much regret to see the preliminary announcement of the dispersal next autumn of Mr. C. A. Briggs's fine and well-known collection. It is not long since I had the pleasure of looking over it, and I think I may say without question that it will be the finest sale held since Howard Vaughan's, a good many of whose specimens it contains.—THOS. WM. HALL; Stanhope, The Crescent, Croydon.

CAPTURES AND FIELD REPORTS.

COLLECTING IN THE NEW FOREST.—I was staying at Lyndhurst from May 22nd to June 1st with Mr. A. D. Wilson, and below is a list of some of our captures during that time:—Rhopalocera were fairly scarce, *Argynnis euphrosyne* and *Gonopteryx rhamni* being far the commonest. *Argynnis selene*, *Hesperia sylvanus*, *H. tages*, *Syrichthus alveolus*, *Lycæna argiolus*, *Thecla rubi* and *Euchloë cardamines*, were also on the wing; but we could not come across any *Nemeobius lucina*, although we went to Stubby Copse, and met entomologists who had taken some specimens the day before in splendid condition. The moths taken during the day were:—*Macroglossa fuciformis* (flying over the rhododendrons at the Rhinefields), *Scodonia belgiaria* (on a heath near Lyndhurst we took over four dozen, the males and females being in equal proportions), *Lithosia mesomella*, *L. aurcola*, *Euthemonia russula*, *Tanagra chærophyllata*, *Euclidia mi*, *E. glyphica*, *Anarta myrtili*, *Ephyra punctaria*, *E. trilinearia*, *Venilia maculata*, *Anaitis plagiata*, *Tephrosia consonaria*, *T. crepuscularia*, *Melanthia ocellata*, *Odontopera bidentata*, *Cidaria comma-notata*, *Drepana falcula*, *D. unguicula*, *Iodis lactaria*, *Corycia temerata*, *Ellopiæ fasciaria*, *Fidonia atomaria*, *F. piniaria*, *Thera obeliscata*, *Larentia pectinitaria*, *Hylophila prasinana*, and *Phytometra ænea*; while *Ligdia adustata*, *Coremia propugnata*, *Lithosia aureola*, were taken at dusk. We sugared every night, but the results were not nearly as good as we expected. The nights were very cold and misty, and this may have had something to do with the scarcity of moths at the sugar. We got however the following moths:—*Moma orion* (only one perfect specimen), *Aplecta herbida*, *Grammesia trilinea*, *Thyatira batis* (the commonest moth at sugar, and in very fine condition), *Noctua festiva*, *Miana strigilis*, *Agrotis exclamationis*, *Acronycta megacephala*, *A. psi*, *Gonoptera libatrix*, *Tephrosia extersaria*, and *Melanippe montanata*. Larvæ were very abundant, especially during the first two or three days, but most of them were ichneumoned. By beating the oaks we obtained over fifty larvæ of *Catocala sponsa*, and only three *C. promissa*;

the other larvæ were *Thecla quercus*, *T. betulæ*, *Limenitis sibylla* (one pupated the same day on which we found it, and the imago emerged on June 6th), *Argynnis paphia*, *Bombyx quercus*, *B. neustria*, *Amphipyra pyramidea*, *Tæniocampa miniosa*, *T. munda*, *Cleora glabraria*, *Liparis monacha*, *Hylophila bicolorana*, *Cymatophora ridens* (not nearly as abundant as in 1894 and 1895), *C. flavicornis*, and *Diloba caruleocephala*.—H. O. WELLS; Hurstfield, The Avenue, Gipsy Hill, July 7th, 1896.

From June 29th till July 8th my whole time, with the exception of one rainy day, was spent in extracting gorgeous specimens from what seemed at first sight an inextricable mass of forest. Lepidoptera and Coleoptera were the favoured branches of natural history—*chacun à son goût*. The weather was completely as it should be for collecting, and many were the excursions made by day under a sun that gave out heat enough to daunt any save ardent entomologists. It was fairly surprising, to one who has not done much collecting before in the forest, to note the swarm of “bug-hunters” that invaded the place, and will continue to invade it, until the objects of their pursuit become extinct. Each night, at sugaring time, the favoured spots were ablaze with lanterns, carried by “similarly afflicted ones,” hurrying from patch to patch, endeavouring to capture their rarities, and at the same time throwing a hurried glance at the trees in their rear, for fear of possible poachers. At times one might be fortunate enough to secure the two best rides for night work, but such a keen rush is made for these places that the most determined takes possession at 4 p.m., thus having to wait four hours in solitude until the “sticky” time arrives. Of course the holder has the consolation of witnessing the would-be holders walk past with disgust written on their faces, which immediately gives way to sarcasm should conversation ensue. How the collector feels if the night turns out an utterly unprofitable one I am glad to say I do not know. *Limenitis sibylla* swarmed, and always with it, but in greater numbers, *Argynnis paphia*. Two black (one without a trace of white) varieties of the former, and a variety coming between *valesina* and the type of the latter, head the list of the Rhopalocera. A male *A. paphia*, with white spots, was also taken; and what I consider to be the best thing I saw, a strikingly handsome variety of the male *A. paphia*, I missed; my hand trembles now, as I think of that fatal moment. But more valuable space I must not use with talk. The following list includes insects taken or seen during daylight;—*Argynnis selene*, *A. adippe*, *A. paphia* and var. *valesina*, *Vanessa atalanta*, *V. polychloros* (saw one), *Limenitis sibylla* and two of the black variety, *Apatura iris* (saw one), *Satyrus semele*, *Thecla quercus*, *Lycæna ægon*, *Hesperia sylvanus*, *Bombyx rubi*, *Nemeophila russula*, *Boarmia roboraria*, *Metrocampa margaritaria*, *Cleora glabraria*, *C. lichenaria*, *Pseudoterpna cytisaria*, *Phorodesma bajularia*, *Bupalus piniaria*, *Eubolia plumbaria*, *Hypena proboscidalis*, and *Endotricha flammealis*. Night captures are perhaps rather more numerous. Among these were:—*Acronycta tridens*, *Leucania turca*, *Triphæna subsequa*, *Erastria fuscula*, *Catocala sponsa*, *C. promissa*, *Toxocampa pastinum* (I have never known this at sugar before), *Aplecta herbida*, *Nola strigula* (very abundant), *Lithosia mesomella*, *Calligenia miniata*, *Boarmia roboraria* (female), *B. repandata* var. *conversaria*, *Aventia flexula*, and *Melanthia albicillata*. *C. promissa* at best is a “slippery customer,” and one that wants well knowing before you can expect to obtain a fine series. To net them is useless; once inside the net they invariably emerge in hopeless fluff. To bottle them straight away off the tree is practically the sole way of obtaining them

perfect, but often they won't wait for the bottle. Long before it is dusk they will come to the sweets; but from 9 p.m. till 9.30 or 9.45 p.m. is the time when they may fairly be called "thick," that is to say, two and three on a tree. Forty was our biggest take in one night. A word about *T. subsequa*: Is this in a true sense a distinct species from *T. orbona*? A well-known local collector in the forest told me he had obtained ova from *subsequa*, and therefrom bred *subsequa* and *orbona* intermixed, pointing out at the time the specimens.—C. J. NASH Pitnacree, Culver Road, Reading, July, 1896.

LEPIDOPTERA OF ARGYLLSHIRE.—The following is a list of some of the Macro-Lepidoptera which I have taken in Argyllshire about Loch Riddon during the last few years, and chiefly in the months of August and September. In a little book, entitled 'The Fauna and Flora of Clydesdale and the West of Scotland,' 1876, Mr. King gives a list of the Lepidoptera taken chiefly within ten miles round Glasgow on the north side of the Clyde, and at a few outlying localities. I suppose Loch Riddon might come among such outlying localities as it is an offshoot of "The Clyde," and so it is not surprising that almost every insect that I took had been already recorded for the district. The country is mountainous, and well wooded near the sea-level.

Rhopalocera:—*Pieris brassicæ*. Larvæ were found every year about the garden; pupæ were generally attached to the trunks of some small trees in a neighbouring plantation.—*Vanessa urticæ*. Imagos hibernated every year in the house; they would sit upon the ceilings in dark corners and passages all through August, even when the weather was very hot, and when disturbed they would immediately go back to their places and settle down quietly as before.—*Erebia æthiops (blandina)*. Very common in places; I took one female specimen which has no white centres to the black spots on the fore wings, and as these black spots are rather larger than usual and contained in a somewhat extra wide chestnut blotch, the insect has a curious appearance.—*Lycæna icarus*. One specimen on August 15th; this date would seem to indicate that it belonged to a second brood.

Sphinges and Bombyces:—*Macroglossa fuciformis*, L. (South's List), = *Hemaris tityus*, L. (Kirby, *ante*, p. 40). One larva, which pupated on August 20th; this seems rather late even for Scotland.—*Hylophila prasinana*. One larva.—*Spilosoma fuliginosa*. The larva of this moth appears to me to require food in the spring after hibernation, although they will spin up without any, and produce stunted specimens; on the other hand, *Bombyx rubi* certainly do not feed after hibernation.—*S. men-thastri*. Fore wings always cream colour; never white.—*Orgyia antiqua*, *Bombyx callunæ*. Larva only common once, i.e. in 1893.—*B. rubi*. Larva always very common.—*Odonestis potatoria*. One imago and larvæ several times on the moors, but not at much elevation; Mr. King, in his list, also mentions this moth; but Mr. Barrett (Brit. Lep. vol. ii.) says of it, "apparently absent from Scotland."—*Drepana lacertinaria*, *D. furcula*.—*Notodonta dictæa*. Of a much whiter colour than South England specimens; just like those figured and described in Mr. Barrett's book as coming from Aberdeen.—*N. chaonia*. One specimen.

Noctuæ:—*Demas coryli*.—*Acronycta rumicis*. Scarce, all darkish.—*A. menyanthidis*. Larva often not uncommon on the moors, and feeding upon almost anything; I found that they generally died in pupa.—*Leucania comma*.—*Cænobia rufa*. Often seen flying on the moors towards dusk.—*Hydræcia nictitans*. Often to be found not uncommonly at rest on heads of ragwort, generally in a worn condition; they all seem to me to

belong to the form which Mr. Tutt calls *lucens*.—*H. micacea*.—*Charæas graminis*. Not common.—*Apamea gemina*.—*Celena haworthii*. Common on the moors; the species flies very swiftly in the afternoon.—*Stilbia anomala*. A few.—*Caradrina quadripunctata*, *Agrotis suffusa*, *Noctua baia*, *N. neglecta*, *Triphana ianthina*, *T. fimbria*.—*Orthosia suspecta*, including the pale form.—*O. lota*, *O. macilenta*.—*Cerastis vaccinii*. Common.—*Scopelosoma satellitia*. Common.—*Xanthia fulvago* (*cerago*), *X. flavago* (*silago*), *X. circellaris* (*ferruginea*).—*Cirrhædia xerampelina*. Two imagoes, one of them at light; several pupæ, but all dead when dug up.—*Calymnia trapezina*.—*Polia chi*. I took a large number of this species one year in Kintyre, Argyllshire, and they were all quite typical; no sign of var. *olivacea* among them. *Epunda lutulenta* var. *luneburgensis*, one.—*E. nigra*, *Miselia oxyacanthæ*, *Agriopis aprilina*, *Aplecta occulta*, *Hadena adusta*.—*H. protea*. Very common, sometimes at sugar in the woods.—*H. oleracea*, *H. contigua*, *H. pisi*. Larvæ often on the moors; they seem to eat anything.—*Calocampa vetusta*, *C. exoleta*, *C. solidaginis*, *Gonoptera libatrix*, *Plusia interrogationis*.

Geometræ:—*Crocallis elingaria*. Sometimes resting on the heather on the hills.—*Eugonia alniaria* (*tiliaria*). A very few at light in September, and once a female specimen on the moors on November 22nd.—*Himera pennaria*, *Amphidasys betularia*.—*Geometra papilionaria*. One specimen; it is not so fine a green as specimens from the South of England.—*Iodis lactearia*, *Anisopteryx æscularia*, *Oporabia filigrammaria*, *O. dilutata*, *Larentia salicata*, *L. olivata*, *Eupithecia pulchellata*, *E. nanata*.—*Hypsipetes sordidata*. Some are very handsomely mottled with reddish brown and yellowish colour; mountain specimens are smaller than those taken in the woods by the sea.—*Melanthia bicolorata*. Rare.—*M. ocellata*, *Coremia designata*.—*Phibalapteryx lapidata*. Seen at three or four different spots; it flies considerably before dusk, and frequents places on the moor where there is plenty of grass and rushes; I have seen it at no more than 200 to 300 feet elevation.—*Cidaria prunata*.—*C. testata*. The females of the latter vary a good deal; I often took them resting on the heather.—*Epunda lichenea*. I reported this species from this locality in error (Entom. xxiv. p. 246).—W. M. CHRISTY; Watergate, Emsworth, Hants, July 17th, 1896.

PLUSIA MONETA IN SURREY.—I took a specimen of this moth flying at light on the 5th inst., at Sutton, Surrey. — A. J. ELDRED; London Hospital, E., July 7th, 1896.

On the 8th of this month I caught a very fine specimen of *Plusia moneta*, in a sitting-room opening into the garden, from which it was attracted by the light. I caught a specimen last August in this same garden, which I have already reported.—J. B. MORRIS; Malden House, Malden Road, Wallington, Surrey, July 10th, 1896.

Towards the end of May some friends found in their garden five bright yellow cocoons, attached to the under side of leaves of *Delphinium*, three of which were kindly given to me. These duly produced imagoes of *P. moneta*. An empty cocoon was afterwards found in another garden. Altogether, with the above, no less than nine specimens of this species have now been found at Weybridge.—(Rev.) J. E. TARBAT The Common, Weybridge, July 15th, 1896.

PLUSIA MONETA IN KENT.—I have again found larvæ of *Plusia moneta* in my garden here, and have bred three splendid specimens, the last one emerging to-day, June 29th. — LEWIS F. HILL; 45, Freeland Road, Bromley, Kent.

PLUSIA MONETA IN EAST BERKS.—This handsome moth has now become extremely common in the neighbourhood of Ascot. The food-plant, monkshood, is much grown in cottage gardens about here, and from the largest of a few clumps growing in our own garden I obtained a long series of the moth on the evening of June 28th, bottling them from the flowers by lantern-light, and scarcely using the net. More specimens, but worn, were to be seen on the two succeeding nights.—M. J. MANSFIELD; Hurstcroft, Ascot, July 1st.

BOMBYX QUERCUS AB.—In the spring of 1895 I collected a large number of larvæ of this species on the coast sandhills. Most produced moths the same season, but eleven pupæ remained over until this year; these have now emerged, and amongst them is a female having the base of each wing thickly covered with dark scales; but these rapidly decrease in quantity, thus appearing to form all round the outer margins a very broad band almost entirely devoid of scales, although the fringes are perfect and very distinct. Amongst the large number bred there is great variation in the depth of the ground colour: but the specimen specially referred to is totally different to anything I have seen, and altogether is a most striking and interesting specimen. — C. F. JOHNSON; 59, Lowfield Road, Stockport, July, 1896.

SESIA MYOPIFORMIS.—On June 27th I caught in the garden here a perfect female of *S. myopiiformis*.—H. W. BELL-MARLEY; Ravenscourt Park.

[Probably there is an old apple or pear tree in the garden where the insect was taken, or at least in one not far away. We used to obtain *S. myopiiformis* freely from an old jargonelle pear-tree which grew in a garden near Regent's Park.—ED.]

THECLA W-ALBUM AT READING.—On the 12th inst. I boxed a specimen of the above insect; it was settled on the flowers of bramble in a lane close to my house; I don't think it has been taken within five miles of Reading before. Although I searched the lane I could not find another specimen, neither could I find the food-plant (wych elm).—W. E. BUTLER; Hayling House, Reading, July 19th, 1896.

THECLA W-ALBUM AT CHALFONT ROAD, BUCKS.—Several of the members of the South London Entomological and Natural History Society who went down to this locality on Saturday, the 18th inst., had the satisfaction of taking this species. Unfortunately, however, the specimens were not all in the best possible condition. I have collected in the district, at the same time of year during several seasons, but never saw the species there before. I should note that I also saw a female specimen of *Argynnis paphia*, another species new to me for the district.—RICHARD SOUTH; 100, Ritherdon Road, Upper Tooting, S.W., July 21st, 1896.

VANESSA C-ALBUM IN STAFFORDSHIRE.—A fine freshly emerged specimen of the above butterfly was taken here by my brother-in-law, Mr. J. R. B. Wasefield, in his garden, on July 11th.—E. W. H. BLAGG; Cheadle, Staffordshire, July 21st, 1896.

ABUNDANCE OF CHEROCAMPA PORCELLUS.—No fewer than eighty or ninety specimens were taken at my home in Gloucestershire. So abundant were they that these specimens were picked specimens; all slightly worn were left to follow their own sweet will. Two *C. elpenor* were as nobles amongst a rabble. The last species is new to my list for Gloucestershire.—C. J. NASH; Pitnacree, Culver Road, Reading, July, 1896.

LYCENA ARION IN THE COTSWOLDS.—I recently took a small series of this species in an unrecorded locality in the Cotswolds. The specimens are considerably larger than the average size of the type from the "Gloucestershire Alps."—W. HARCOURT-BATH; June 29th, 1896.

SOCIETIES.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*June 25th, 1896.*—R. South, Esq., F.E.S., President, in the chair. Mr. West, of Streatham, exhibited a bred series of *Hypsipetes ruberata*, containing uniform and banded specimens, and a specimen of *Trochilium crabroniformis*, bred from an osier-stem cut at Streatham in expectation of obtaining *Sesia formiciformis*. Mr. R. Adkin, a bred series of *Eupithecia venosata* from Hoy, with series from Shetland, Forres, and Isle of Man for comparison, and noted that the Orkney ones were of a browner shade, while the Isle of Man specimens were like South of England netted forms; also full-fed larvæ of *Calocampa vetusta* reared on dock from Inverness-shire ova. Mr. Barrett, a series of the rare *Osmylus chrysops* from Haslemere. Mr. South, types of the variation obtained from a brood of *Spilosoma menthastri* from Aberdeen. Several were smoky, one had dark fringes, in another the edges of all the black markings had run in appearance. Mr. McArthur, the five most remarkable forms of *Abraxas grossulariata* bred this year from some 3000 larvæ. In one the black external to the yellow band was almost entirely suffused; another was slightly smoky, and the spots had the appearance of having run; a third had the fore wings almost entirely black, with the outer half of the hind wings wholly black; another had the hind wings with a narrow black border, from the middle of which a wide streak ran into the centre of the wing. The smoky form was remarked as being very rare. Mr. Dennis, a series of *Cænonympha typhon* from N. Lancashire taken early in June. The specimens had very pure white markings underneath, referable to var. *rothlebi*. He also exhibited several very brilliant *Cyaniris argiolus* from Horsley, of a shade approaching that of *Polyommatus bellargus*. *Limenitis sibylla* was reported as out in the New Forest early in June.

July 9th.—C. G. Barrett, Esq., Vice-President, in the chair. Mr. R. Adkin exhibited a short bred series of *Dianthæcia nana* (*conspersa*), from larvæ taken in Hoy. They were all dark in colour, about midway between the Shetland and Scottish mainland forms. Also a series of *D. capsicola*, from the same locality, showing no variation from the usual English form. Mr. Auld, series of varieties of *Abraxas grossulariata* bred this year. One specimen was of an unusual form, the basal half of each wing being curiously streaked, while the outer half was quite normal. On the hind wings the streaks were very irregular in length. Mr. Turner, series and life-histories of the following species of *Coleophora*:—*C. lineolea* from Brockley and Lewisham, *C. albitarsella* from Lewisham, *C. palliatella* from Epping Forest, *C. lariciella* and *C. fuscadinella* from Carlisle. The latter species showed the young curved cases, which are abandoned early and new straight ones made. Also living pupæ of *Gonopteryx rhamni* from

Byfleet. Mr. Lucas, bred specimens and pupa-skins of the local dragonfly *Erythromma nias* from Byfleet. Mr. Enock, a living specimen of the very rare male of *Prestwichia aquatica*, which, with the assistance of Messrs. Dennis and Scarfield, he had discovered in a pond in Epping Forest. It had only the merest rudiments of wings. He much doubted the statement that the species was parasitic on the eggs of dragonflies. The ovipositor seemed too strong and too long. He suggested that the ova were deposited in some aquatic larvæ.—HY. J. TURNER, *Hon. Report Sec.*

NORTH LONDON NATURAL HISTORY SOCIETY.—On Friday, May 22nd, 1896, the Society started on their annual Whitsuntide excursion to the New Forest. Messrs. C. B. Smith, L. J. Tremayne, C. Nicholson, R. W. Robbins, and W. H. Smith left Waterloo by the usual 5.50 train, and arrived at Lyndhurst Road soon after 9 o'clock. Thence they proceeded by omnibus to Lyndhurst, and were comfortably settled in their rooms at Lynwood a little before 10 o'clock. The following morning was dry, but dull. All the members were out before breakfast. The fences only yielded a specimen of *Eupithecia vulgata*, a specimen of *Coremia ferrugata*, and a worn specimen of *Tæniocampa stabilis*; but a walk round Pond Head enclosure revealed the fact that larvæ, at any rate, were about in their usual numbers. Mr. Bacot turned up at breakfast time, and soon afterwards the whole party started out, taking the route down Beechen Lane. Larva-beating was immediately commenced, but only with moderate success. The quantity, indeed, was great, but the quality left much to be desired. All the Hybernias were common, *H. defoliaria* and *H. marginaria* being particularly plentiful. But the more satisfactory larvæ were, for the most part, scarce, and the following were beaten at various times throughout the trip:—*Psilura monacha* (one or two), *Eupithecia abbreviata* (one), *Himera pennaria* (common), *Asphalia ridens* (a few), *Brephos parthenias* (a few off birch), *Asphalia flavicornis* (a few off birch), *A. diluta* (a few off sallow), *Cleoceris viminalis* (a few off sallow), *Hypsipetes sordidata* (a few off sallow), *Thecla quercus* (two), *Catocala promissa* and *C. spona* (a few), *Tæniocampa miniosa* (in plenty off oak), *Amphipyra pyramidea* (a few), *Hylophila bicolorana* (one), *Cubera pusaria* (one), *Agriopsis aprilina* (one). A notable absentee was *Amphidasys strataria*; whilst *Miselia oxyacanthæ* and *Diloba cæruleocephala* were also not in evidence. The day showed signs of becoming brighter, and a few butterflies appeared on the wing, including *Argynnis euphrosyne* and *Pararge egeria*, the latter in very fine condition, evidently the second brood just emerging. On turning into the pine woods, plenty of moths were found flying, mostly *Thera variata*, *Panagra petraria*, and *Venilia macularia*, though Mr. L. J. Tremayne took a specimen of *Drepana lacertinaria*, and Mr. C. Nicholson one of *D. falcataria* and one of *Cidaria suffumata*. The party worked on to the railway line in the hope of taking *Macroglossa fuciformis* (the narrow bordered hawk), but the *Alkanet* was mostly over, and the sun was not bright enough to induce these insects to fly. The party thereupon made a halt for lunch, obtaining a plentiful supply of milk from a cottage just across the line. After lunch, finding collecting decidedly slack, the party rested for an hour or so on the railway bank, except Mr. C. B. Smith,

who worked further down the line. Eventually, the members, still without their President, turned towards home. The railway bank had yielded *Syrichthus malva*, *Nisoniades tages*, *Euclidia mi*, and *E. glyphica*, and one or two specimens of *Lycæna icarus* were also flying about. One specimen of *Thecla rubi* had also been taken by Mr. W. H. Smith during the day. The party worked back through Denny bog and wood, and on their arrival at Lynwood found Mr. Harvey awaiting them. The President did not appear till some time afterwards. He had, it appeared, been right up to the *lucina* ground, but failed to find that insect, the weather being much too dull, but had been rewarded by a couple of specimens of *Macroglossa fuciformis*, and one of *M. bombyliiformis* (the broad-bordered species). After tea the party set out to sugar in Hurst Wood. Plenty of *Geometræ* flew at dusk, but these proved to be only *Larentia viridaria*, *Panagra petraræ*, and other common kinds. Before the sugar was well laid on, rain began to fall, which it soon became evident had set in for the night. We soon had to return home, but not before it became obvious that not a single moth was coming to the sugar; and "assembling" with a specimen of *Eurymene dolobraria* obtained by Mr. Bacot in the afternoon was equally unprofitable. On Sunday morning Messrs. L. J. Tremayne and Bacot worked before breakfast in "Jones's" enclosure for the larvæ of *Limenitis sybilla*, but without result; and a search for the larvæ of *Argynnis paphia* in Beechen Lane was equally unsuccessful. After breakfast the whole party started for Rinefield, with the exception of Mr. Nicholson, who preferred to go for *Nemeobius lucina*. The day was fine and bright, and the members spent some little time on Butt's Lawn searching for *Thecla rubi*, but they were unsuccessful, though some fine specimens of *Phytometra viridaria*, *Ematurga atomaria*, and *Argynnis euphrosyne* were taken. They then turned into Hurst Wood, where hard beating produced about twenty larvæ of *Catocala promissa*. On emerging on to the heath between Hurst Wood and Vinney Ridge, the members were unable to resist the temptation of a dip in the Lymington river, after which they proceeded direct to Rinefield. Contrary to expectation, the rhododendrons were scarcely out at all, though the azaleas were in full bloom, and the latter afforded most of the attraction for the few insects that were on the wing. Although Mr. Harvey took a specimen of *M. bombyliiformis* almost immediately on entering the avenue, scarcely any more were seen, and though the members remained on the ground for an hour or two, no success rewarded their patience. In the afternoon the party returned home *viâ* Vinney Ridge and Butt's Lawn. In the evening Messrs. L. J. Tremayne, R. W. Robbins, Harvey, and Bacot started to dusk at Matley. Going across the heath by the side of the Matley Road, they turned up a few specimens of *Scodiona belgiaria* at rest. Mr. L. J. Tremayne also took a specimen of *Drepana lacertinaria* flying. Dusking at the bog, however, again proved a failure, as, with the exception of some rather worn specimens of *Pachycnemia hippocastanaria*, nothing worth taking was netted. Subsequently the party returned across Whitemoor, and took a few more *Scodiona belgiaria*. The next day was spent by the members at Stubby Copse working for *Nemeobius lucina*, of which Mr. Nicholson had taken seven yesterday. Very moderate success, however, attended the North Londoners to-day,

as, although there was plenty of sunshine, the species was only taken singly, and the numbers only reached about seven in all. Several other collectors were observed in the rather restricted localities to which this insect is confined, and it is feared that these may be getting somewhat worked out. There were plenty of insects on the wing, but nothing of any special note was taken. The members had to return to town the same evening. One or two larvæ of *Bombyx trifolii* were taken during the trip, but it is not thought advisable to give the exact locality.—LAWRENCE J. TREMAYNE, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*June 15th, 1896.*—Mr. R. C. Bradley in the chair. Mr. J. W. Moore, 194, Stratford Road, Birmingham, was elected a member of the Society. Exhibits:—By Mr. J. T. Fountain, *Arctia villica*, bred, from Dawlish; *A. fuliginosa* var. *borealis*, bred, from Scotland, and other insects. By Mr. A. H. Martineau, three specimens of the very rare aculeate *Sapyga clavicornis* which he had recently taken at Solihull. He said that in rest the insect lays its big clubbed antennæ between its legs along the under side of his body, and quite out of sight, the clubs being turned upwards at the end. By Mr. C. J. Wainwright, a specimen of the rare *Doros conopseus* taken in Wyre Forest at Whitsuntide. He said it was probably the handsomest British dipteran. Also a specimen of *Polyommatus phleas*, from Sutton, in which the colours and markings of the left wings both above and underneath were bleached, having the appearance of being rubbed, though the specimen was in good condition, with all its scales. Also a short series of *Hadena genistæ* from Wyre Forest. By Mr. R. C. Bradley, a specimen of *Spilosoma menthastri*, from Sutton, with very few spots on its wings; also a *Cucullia* bred from a larva found on the scabious at Barmouth, and which appeared to be *asteris*, but was unfortunately crippled; also a specimen of *Dioctria rufipes* with an ichneumon nearly as large as itself which it had captured.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

RECENT LITERATURE.

Abstract of Proceedings of the South London Entomological and Natural History Society for the year 1895; together with the President's Address. Pp. 107. Published at the Society's Rooms, Hibernia Chambers, London Bridge, S.E.

WE gladly welcome the appearance of this most interesting little publication. Although falling short of the volume for 1894 in the matter of pages, it compares very favourably therewith in the quantity of solid information that it contains. Among the papers is one on the variation of *Erebia athiops* by Mr. Tutt, and this is a valuable contribution to our knowledge of the subject. The Report of the Council shows that the present effective strength of the Society is no less than one hundred and eighty members, and this fact, together with the further one that the substantial balance of nearly twenty-nine pounds remained in hand at the close of the financial year, are matters upon which we heartily congratulate the Society.

EXCHANGE.

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Duplicates.—Phorodesma Smaragdaria.* *Desiderata.*—Numerous.—W. S. Fremlin: Western Dispensary, Rochester Row, Westminster, S.W.

Duplicates.—Pupæ of Pavonia; ova of Curtula. *Desiderata.*—Larvæ and pupæ very numerous.—G. R. Garland; 94, Sedgwick Road, Leyton, Essex.

Duplicates.—Ova of Ligniperda. *Desiderata.*—Imagines of C.Album, T. Quercus, Artemis, Blandina. Black pins. Full data.—H. L. Wood; Old Grammar School House, Ashford, Kent.

Duplicates.—Mesomella, Rumicis, Rubiginata, Maculata, Variata, Umbratica, Chi, Galathea. *Desiderata.*—Numerous; larvæ preferred.—Rev. C. F. Thornewill; Calverhall Vicarage, Whitchurch, Salop.

Duplicates.—Larvæ of Mendica, Carpini, Antiqua, Illunaria, and Cæruleocephala; pupæ of Potatoria, Caia, and Filipendulæ. *Desiderata.*—Larvæ of Lanestris, Ligustri, and Nupta; ova of Ocellatus.—W. Blackwell; Knockholt, near Sevenoaks, Kent.

Duplicates.—Suasa, Lineola, Reticella, Castrensis, Smaragdaria and young larvæ. *Desiderata.*—Fluviata, Glabraria, Pusillata, Trisignaria, Notha, Occulta, Atriplicis, Bractea, Cordigera, and other good species in fine condition.—F. G. Whittle; 3, Marine Avenue, Southend.

Duplicates (dragonflies).—E. najas, P. pennipes, P. tenellum, A. formosus. *Desiderata.*—L. fulva, S. flaveolum, S. sanguineum, O. curtisii, A. vulgatissimus, Æ. rufescens, L. nympha, A. mercuriale, I. pumilio.—W. J. Lucas; 21, Knight's Park, Kingston-on-Thames.

Duplicates.—Co. Waterford: Paphia (fine), Napi, V. Urticæ* and larvæ, Semele, Egeria, Megera, Tithonus, Pamphilus, Argiolus (a few), Jacobææ and larvæ, Phlœas (numerous), &c.; O. Dispar (bred from bought ova). *Desiderata.*—Very numerous, especially Geometræ.—L. H. Bonaparte-Wyse; Manor of St. John's, Waterford.

Duplicates.—Minos (Welsh). *Desiderata.*—Edusa var. Helice, Hyale, Iris, Pruni, Myopæformis, Formicæformis, Chrysidiformis, Ichneumoniformis, Cynipiformis, Apiformis, Arundinis, Æsculi, Asellus, Testudo, Albulalis, Strigula, Muscerda, Gomplana, Caniola, Stramineola, Gonostigma, Cratægi, B. Trifolii, Hamula, Bicuspis, Cassinea, Carmelita, Dictæoides, Trepida, Dodonæa.—E. W. H. Blagg; Cheddle, Staffordshire.

Duplicates.—Ophiogramma* (a few), Capsophila (some bred), Tenuiata,* Umbratica, Iota, Festu æ, Triplasia, black Monoglyphæ, and others,—when off the boards. *Desiderata.*—Atropos, Galii, Sphegiformis, Plantaginis var. Hospita, Cænosa, Cuculla, Octogesima, Fluctuosa, Cinerea, Ashworthii, Sobrina, Hyperborea, Rubiginea, Cæsia, Xanthomista, Lutulenta var. Luneburgensis, Fucifera, Venustula, Hera,* Villica, Verbasci.*—W. B. Thornhill; Castle Cossey, Castle Bellingham, Ireland.

CHANGES OF ADDRESS.—W. Harcourt-Bath, to 176, Ombersley Road, Moseley, Birmingham. W. L. Distant, to 4, Westbourne Terrace, Lower Addiscombe, Surrey.

MEETINGS OF SOCIETIES.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.—Meetings on the 2nd and 4th Thursdays in each month, at 8 p.m.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—The meetings of this Society (held at the London Institution, Finsbury Circus, E.C.) will take place on the 1st and 3rd Tuesdays in each month, from 7.30 to 10 p.m. as heretofore.

NORTH LONDON NATURAL HISTORY SOCIETY.—Meetings are held on the 2nd and 4th Thursdays in each month at the North East London Institute, Dalston Lane (close to Hackney Downs Station on the G.E.R.), from 7.45 to 9.30 or 10 p.m.

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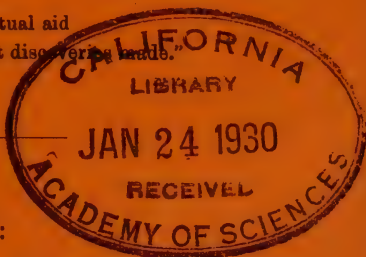
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VOL. XXIX.]

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UNIFORMITY IN SETTING.

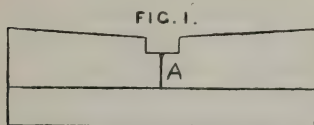
By J. H. LEECH, B.A., F.L.S., &c.

BESIDES appearance, uniformity of setting facilitates the comparison of specimens to a very great extent. The methods I am about to refer to have been adopted in my own and other large collections both of British and foreign Lepidoptera, and I seldom introduce specimens from foreign sources into my collection without having them reset. The continental or flat style of setting has the following advantages over that usually practised in England:—The pins are of uniform length for all thicknesses; the specimens are well raised off the bottom of the drawer, so that there is less danger of their being attacked by mites, &c.; the wings are flat, and therefore in a better position for examination and comparison than when sloped and curved to different extents according to the fancy of the collector, or the maker of the setting-boards; the fringes also are not liable to damage through contact with the bottom of the drawer, which is so often the case with insects set in the English fashion. The advantages of flat setting have been recognized at the Natural History Museum for some years; and within the last year or so, the largest and most valuable collection of Lepidoptera in this country is being entirely reset.

In setting insects, the first thing to consider is the pin. There are many different sorts and sizes; the white and gilt varieties are, however, almost universally condemned, owing to their liability to verdigris and corrosion. My experience of the English black pins (speaking of some years ago) is that they are too soft, and the points very blunt. For some years I used an iron pin of foreign make enamelled black; this pin was not found satisfactory, as it was too soft, and the enamel was so bad that the pins when used in turf-lined drawers almost invariably

rusted, owing to some ingredient in the turf. I then applied to Messrs. Kirby and Beard, and they made me a steel pin enamelled black. These have points like needles, and I failed to rust them, although I put them to several severe tests. I believe the only reasons they are not generally adopted is that they are not made in English sizes, and that they are rather expensive. The pin bill, however, is about the entomologist's smallest outlay, and hardly worth consideration. I would suggest that half a dozen prominent British entomologists should form a committee to examine this pin, and, if found satisfactory, decide on the best length for the usual English cabinet drawer. The height at which insects are to be pinned could also be determined by the same committee, as suggested by Mr. Searancke (*ante*, p. 231), and setting-boards made accordingly.

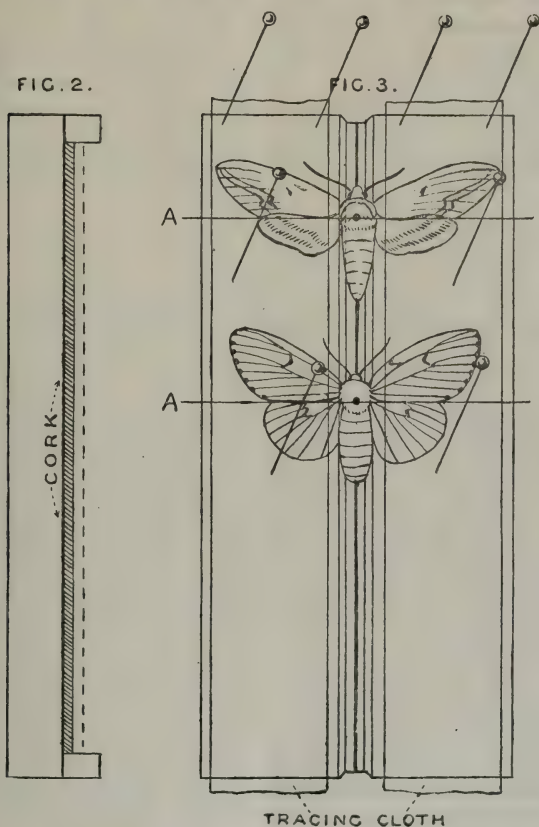
Boards (for the high flat style) should be made of soft wood from half to three-quarters of an inch thick. As the wings of most Lepidoptera have a tendency to droop when taken off the boards, this is obviated by a slight upward slope of the board from the centre; the correct angle has only been arrived at by con-



siderable trouble. Fig. 1 shows the end view of setting-board; the groove in the centre receives the body of the insect, and the pin having to pass through a narrow opening, A, between the groove and the cork, is prevented from leaning to either side.

Fig. 2 represents the side of setting-board with cork below the narrow opening referred to; another strip of wood could be added, as indicated by the dotted line, to keep the pins at a uniform depth. These boards are made by Mr. J. Crockett, Prince's Street, Cavendish Square, both for continental and English setting. A quantity of glass-headed steel pins and some glazed tracing cloth cut into strips will be required. Take the specimen to be set between the thumb and first finger of the left hand, and drive the pin through the centre of the thorax perpendicularly to the plane of the wings. Place the body of the insect in the groove, and drive the pin through the narrow opening and the cork to the required depth. As before explained, the pin can have no lateral inclination, so it is only necessary to see that it does not lean forwards or backwards. Care must be taken that the wings lie easily on the board, and that the body is neither too much elevated or depressed. Next take two strips of tracing cloth, glazed side downwards, and pin them on at the end of each side of the setting-board, as shown in fig. 3. The tracing cloth must be wide enough to cover the wings with the exception of a small portion of the base. Pass the cloth over the wings, pressing it slightly with the fingers of the left hand while the wings are raised into position with the setting-needle

from the uncovered base; a pin can be inserted below the fore wing while the hind wing is being brought into position, but



when this has been done and another pin inserted to keep it in place, as shown in the diagram, the first pin can be removed; additional pins are required to keep the legs and antennæ in place, and sometimes to hold up the body. To set the next specimen all that is required is to turn back the tracing cloth and repeat the process. Now the important point of uniformity in the position of the wings is, I believe, only to be arrived at in one way, that is, to draw an imaginary line following the inner margins of the fore wings and passing through the pin in the thorax, as shown in fig. 3, A, A. This will be found to produce the best results in the majority of Lepidoptera.

I may mention in conclusion that setting-boards should on no account be covered with papered cork, as the pin-holes leave a roughness which is a disadvantage in raising the wings into place. Before using the tracing cloth a second time, it should

be pulled across the back of a knife to remove the roughness of the pin-holes. The object of using glass-headed steel pins is to penetrate the wood, and the round glass head saves the soreness to the finger caused by ordinary pins when much work has to be done. The above described method can be equally applied to the English form of setting. I believe that tracing cloth and glass-headed pins, as adjuncts in the setting of Lepidoptera, were both introduced by that inimitable setter Mr. Arthur Cant, who has probably operated on as many Lepidoptera as anyone living.

Iford Manor, Lewes.

ON SEASONAL DIMORPHISM IN BRITISH BUTTERFLIES.

By W. HARCOURT-BATH.

FOR some time past I have paid particular attention to the seasonal dimorphism of our British Rhopalocera and the accompanying phenomena. I therefore perhaps may be excused in ventilating my views respecting a certain point connected with this subject which I wish to bring before the notice of the readers of the 'Entomologist,' and that is the influence of the climatal conditions in deciding the morphological characters. I will first take the three common species of *Pieris* in order to illustrate what I have to say.

The seasonal characters of *Pieris brassicae*, *P. rapae*, and *P. napi* are undoubtedly familiar to every entomologist. Those of the first brood are so distinct from those of the second that there could be no mistaking to which generation they belonged, even by a tyro. These characters I have, however, observed are subject to considerable modification or variation each season according to the prevailing climatic conditions of the particular year, namely the temperature and the amount of precipitation, the two phenomena being generally intimately connected with each other.

As a general rule, I find that the earliest emergences of the first generation in the spring partake of the distinctive or more pronounced characters of the first brood to the greatest degree. Those which emerge from the chrysalis state later assume more of the characters of the second brood in accordance with the increase of temperature which pertains a month or so more advanced in the season. These earlier emergences are smaller sized specimens than those which follow, and the black spots and markings are in addition more obscure,—in the males, indeed, being frequently almost entirely obliterated. When reared through the winter indoors, where the temperature is higher than that of the outside, the specimens of the spring

brood assume more of the character of those of the second or summer generation. This³ is especially noticeable as regards *Pieris brassicae*, specimens of which both in size and intensity of markings resemble very closely those of the summer brood, so that it is really difficult to distinguish them with certainty. *Pieris rapæ* does not seem to be so similarly affected as regards size, but the markings are generally more distinct; and in the female an ochreous tinge is frequently visible, this being one of the characters which females of the second generation often assume, especially in hot summers, and has been more frequently observed by me upon the Continent than in this country.

Now, as regards the summer broods of these three butterflies. I find the distinctive characters of these similarly affected in accordance with the temperature prevailing at the time or just preceding that of their emergence. In very wet seasons, when the temperature is as a consequence low, the butterflies partake more of the characters of the spring emergence; and this is particularly the case with *Pieris napi*, the under sides of the wings being more strongly veined and clothed with dusky spots than those of the typical summer specimens. I have indeed found specimens of all three species in July which could not be distinguished at all from typical specimens of the spring brood, but whether these are only late emergences of the first generation or not, I am at present unprepared to say. In hot summers, on the other hand, the distinctive characters of the second broods become much more intensified. These manifest themselves in the darker markings on the upper side and in the lighter colouring upon the under side of the wings; this latter appearance being due in large measure to the diminution in the number of dusky scales. In very fine hot summers, when third broods are able to make their appearance, these characters make themselves more prominent still, and the size of the specimens in addition undergoes an increase, as the series in my own collection amply testify.

What conclusions are we able to draw from these facts? They seem to be due to the indirect influence of the temperature upon the chrysalis, in accordance with the views of Weismann, and this in the *latter* stage of its existence. Whether they were originally produced by temperature it is difficult to decide; but if one may be permitted to judge from the more recent of the chameleon-like theories advanced by the learned Professor above-named, the seasonal characters have been rendered permanent by means of natural selection for protective purposes,—if I may employ a metaphorical expression,—the assistance of the climate, that is, the temperature of the season, bringing into activity those particular germs which will enable the perfect insect to assume morphological characters in harmony with the surroundings.

In addition to the seasonal dimorphism of the above three species of *Pieris*, another British butterfly has absorbed a good deal of my attention. I refer to *Vanessa c-album*. In ordinary seasons the light form of this insect, which I have named *lutescens* (*ante*, p. 257), appears in this country only as an aberration of the type of the first brood. The number, however, which appear each season in proportion to the type varies entirely according to the temperature. In exceptionally wet, cold seasons I have thus experienced considerable difficulty in procuring a single specimen of the light form, although those of the dark were not of uncommon occurrence. It is the males which seem to be more affected by the cold and wet, judging from the relative proportions of the two sexes in the variety *lutescens* whenever adverse climatic conditions prevail. The males are similarly less affected by a higher temperature. This season, which has been singularly fine and warm, has been the means of producing the variety *lutescens* in abundance. I have, in fact, taken over thirty of it, but not a single specimen of the type, so that what is in the great majority of seasons only an aberration of the first generation has occurred this year as the type of that brood, as is the case upon the Continent—at least in the centre and the south—every season.

My hypothesis concerning this butterfly—and the facts seem strongly to support it—is that what constitutes the second brood of *Vanessa c-album* in Europe at the present day formerly occurred as the only generation, perhaps shortly after the termination of the glacial period, but that more favourable climatic conditions existing now enable the butterfly to perform its metamorphoses in a shorter period, and thus to make two appearances in the same year instead of only one. The first brood existing now is therefore the most recent production, and the light form of the butterfly in consequence the most highly specialised of the two.

Birmingham, August, 1896.

SILK-PRODUCING LEPIDOPTERA.

By ALFRED WAILLY.

(Membre Lauréat de la Société Nationale d'Acclimatation de France.)

(Continued from p. 239.)

BOMBYX (*Theophila*) SHERWILLI, Moore. The moth of this species much resembles that of *B. huttoni*, but it is a little larger. All that is known of it is that the perfect insect was found in the collection of Major J. L. Sherwill; it is not known whether it was captured in the plains or at Darjeeling.

BOMBYX (*Ocinara*) RELIGIOSÆ, Helfer.—“Although bearing

the generic name of *Bombyx*, the description given by Dr. Helfer applies rather to a species of *Ocinara*. Dr. Helfer calls it the Goree silkworm; and Mr. Hugon, Deomooga silkworm. It is said to be found between Assam and Sylhet."—Capt. Hutton.

In his report on 'Silk in Assam,' dated February 29th, 1884, Mr. E. Stack, Director of Agriculture, speaks as follows respecting this species:—"This silkworm (*Bombyx religiosæ*) is called Deomuga on account of its large size. It is the largest of all silkworms; it attains a length of six and one-half inches; it is also the handsomest." Mr. Buckingham speaks of it thus:—"This silkworm lives on the sum (*Machilus odoratissima*), sometimes with the common Muga. In the second and third stages it is of remarkable beauty, with rows of turquoise blue on the sides. In the fourth stage the blue spots disappear and golden yellow spots replace them. On each side of the body there are bands or stripes of all the colours of the rainbow, which make this silkworm by far superior to all others in beauty." The Deomuga lives, it is said, thirty days, and spins its cocoon in three days. The moth emerges at the end of fifteen days in hot weather, and at the end of thirty days during the cold season; the moth lives four days. The cocoon is large (3 in. by $1\frac{1}{2}$ in.); it produces a large quantity of strong and coarse silk. The thread of the Deomuga is employed in Bengal to make fishing lines. At Cachar the Deomuga lives on *Ficus indica*, and on the Pipal (*Ficus religiosa*). It is found generally in the valley of Assam.

OCINARA LIDA, Moore. This species is found in Mussoorie. The larva, which resembles that of a geometer, lives on *Ficus venosa* and the wild fig tree. It spins a small white cocoon on a leaf or on a stone at the foot of the tree; the cocoon is too small to be of any utility.—Capt. Hutton.

OCINARA LACTEA, Hutton. This species is also found at Mussoorie, and it lives on *Ficus venosa*, spinning in a leaf a small and curious yellow cocoon which is surrounded by a yellow silk net-work. The larva is smooth, whilst that of *O. lida* is hairy.—Capt. Hutton.

OCINARA COMMA, Hutton. The moth of this species is white, with a dark mark having the shape of a comma on the disc of the four wings. It is found in the Doon, at about 5500 feet above Mussoorie.

TRILOCHA VARIANS, Moore. A small species, discovered at Canara, and by M. Grote at Calcutta. It is useless as a silkworm.

RHODIA NEWARA. A very interesting species, with a curiously shaped cocoon, which is green. The larva feeds on weeping willow.

RHODIA FUGAX. A species from Japan, similar to *Rhodia newara* but somewhat smaller. Feeds on all species of *Salix*. Easily reared last year by me and several of my correspondents

on the Continent. The larva, like that of *newara*, hybernates in the ovum state. A peculiarity of the *fugax* larva is that it squeaks when touched, or even if it is slightly disturbed.

CRICULA TRIFENESTRATA. This curious species is found in various parts of India, sometimes in such large numbers that the larvæ completely strip the mango trees of their foliage; they also destroy the foliage of *Acacia catechu*, and even attack the tea trees. It is found in Burmah, Moulmein, and at Chota Nagpore in Central India. The cocoons are in large bundles, and they adhere so firmly to one another that they cannot be separated to be spun, which their structure besides would not allow; therefore they are carded. They are perforated like network, and are of a golden yellow colour. I made this species known in Europe in 1884, and the larvæ were reared with the greatest success. I bred them on oak, plum, apple, pear, and willow trees, and later on plum exclusively; they are very polyphagous.

In Mr. Stack's report the following is said respecting this species:—"Amluri or Ampotoni (*Cricula trifenestrata*).—The Amluri takes its name from the mango tree or Am on which it feeds. It is one of the most common in Assam. It is found in the valley at the foot of the hills on the northern and on the southern side. It is also found at Gachar, where it feeds on the wild tea tree. It is also frequently found on the sum; but its favourite food is the mango tree of the forests or that cultivated near the villages. The chrysalis, like those of all species of silkworms, is eaten, and is considered as a great delicacy by the Kacharis, the Rabbas, the Meches, and the Mikirs. The Rev. F. Camboué has also stated, in his reports on the Madagascar silkworms, that 'some of the natives (the Malgaches) eat with delight silkworm chrysalides, which they fry in fat.'"

During several years I received from the late Dr. John Shortt, of Yercaud, in the Shevaroy Hills, Madras Presidency, large numbers of *Cricula trifenestrata* cocoons; but the great difficulty has also been to receive the pupæ alive, as the moths for the most part emerged in transit about three weeks after the formation of the cocoons.

I may here state that, after several years of experience, I found that if pupæ sent from hot countries are considerably delayed in producing their moths in consequence of a great change of climate, the moths, although the pairings take place, and they seem perfectly healthy, lay eggs that are not fertile, as a rule. Being months instead of weeks before they emerge, the moths of tropical regions seem to have lost their vitality and power of reproduction. Besides, a considerable number of these tropical species die in the pupa state, when the heat is not sufficient to allow the moths to emerge at the very time they are ready to make their appearance.

The *Cricula trifenestrata* cocoons were between five and six weeks on the voyage from Yercaud to London. In about three weeks after their departure the moths commenced to emerge in large quantities, but some died after the arrival of the cases in London. The cocoons which had not hatched in transit died, or did not produce the moths till some time later on; hence the difficulty of obtaining fertile ova of this and other tropical species.

CALIGULA SIMLA, Westwood. The cocoon of this species, in the form of a net-work, resembles in shape that of *Cricula trifenestrata*, but it is larger and of a dark colour, almost black. Some years ago, in 1878 I think, I received cocoons of this species; but all the chrysalides which could be seen moving through the perforated cocoon died some time after. It is found in Simla, at Mussoorie, and in the province of Kumaon, feeding on walnut, *Salix babylonica*, wild pear tree, &c. A similar species is found in Japan, where it feeds on the chestnut tree. This Japanese species is *Caligula japonica*.

CALIGULA THIBETA. Is found at Mussoorie, where it lives on *Andromeda ovalifolia*, wild pear tree, and quince. It is also found in the province of Kumaon. Its specific name is wrong, as the insect never approaches Thibet. The cocoon is coarse, and of a similar texture to that of *C. simla*.

NEORIS HUTTONI, Moore. A species discovered by Capt. Hutton at Mussoorie, at about 6500 feet elevation, living on wild pear. The larvæ are found in April. The cocoon is a net-work, and its silk of no use.

ATTACUS RICINI. The worm of this species produces the silk known to the natives by the name of Arrindy silk. It is reared on the castor-oil plant (*Ricinus communis*). The principal places where this species is cultivated are Assam, East Bengal, Rungpore, and Dinagepore. The Mekirs, in the eastern part of Bengal, possess a very fine race producing white silk. *Attacus ricini* (*Bombyx arrindia*) according to certain sericulturists, is no other than *Attacus cynthia* reared on *Ricinus* in a state of domesticity. It is in Assam that this species is almost exclusively cultivated, and, like the mulberry silkworm, it is also cultivated in a state of domesticity, and bears the name of Eri, a word which means *Ricinus*. The species lives also on the Keseru (*Heteropenex fragrans*); there are also several other trees, such as the Gulancha (*Jatropha curcas*), the Gamari (*Gmelina arborea*), and even, it is said, the Bogri or Ber (*Zizyphus jujuba*), on which the worm can be reared if the *Ricinus* happens to fail. Several times live cocoons of *Attacus ricini* were sent to me from Assam tied to a string placed across the box. The moths emerged so rapidly during the voyage that sometimes they paired, laid their eggs, and the young larvæ were found dead and dried up in the box.

ACTIAS SELENE. A species spread over India and the Island

of Ceylon. The cocoon is closed, but irregular in shape, and it produces but little silk. There are, however, some races, like the Madras race, with a thick and firm cocoon, the silk of which has, it is said, been wound. The moth, which is remarkable for its beauty, is green, and has the shape of a long-tailed *Papilio*, like *P. podalirius* of Europe, and *P. ajax* of North America. The larva can be easily bred on walnut; it lives also on wild cherry. In India it lives on wild pear tree, hazel nut, *Cedrela paniculata*, *Coriara nepalensis*, and several other forest trees and shrubs.

ACTIAS MCENAS, Doubleday. A species found at Darjeeling and in Assam; it is a larger species than *selene*, and the moth is of a bright ochre yellow.

ACTIAS LETO. This is found in the same localities as the preceding species, and there is now no doubt that *mcenas* and *leto* are one and the same species: *mcenas* is the female and *leto* the male. The wings of *leto* are yellow, but are covered with brownish pink blotches, which are wanting in the female *mcenas*.

SATURNIA PYRETORUM. Is found at Darjeeling and Cachar. Nothing more is known of this species.—Capt. Hutton.

SATURNIA GROTEI, Moore. Found at Darjeeling. One or two moths were also captured at Mussoorie. Captain Hutton thinks the larva lives on wild pear.

SATURNIA LINDIA, Moore. All that is known of this species is that it was found in a collection made by the late Captain James Lind Sherwill, and it is supposed it came from Darjeeling or its environs; it is allied to *S. grotei*.—Capt. Hutton.

SATURNIA CIDOSA, Moore. In the collection of Capt. J. L. Sherwill, and found in the north-east of India. We have no information respecting this species. As it is closely allied to *S. pyretorum*, I am inclined to believe that its habitat is Darjeeling or Cachar.—Capt. Hutton.

LÆPA KATINKA, Westwood. The yellow moth of this species is of remarkable beauty, and it was discovered for the first time in Assam; it is also found, I think, at Mussoorie. A small quantity of silk can be obtained from the cocoon.—Capt. Hutton.

LÆPA SAVALICA, Hutton. A species closely allied to the preceding one; it is found at Mussoorie, at 5500 feet, and also at a lower altitude. The cocoon produces a small quantity of silk.—Capt. Hutton.

LÆPA MIRANDA, Atkinson. A fine species, discovered at Darjeeling by Mr. Atkinson, but no other information is given.—Capt. Hutton.

LÆPA SIKKIMENSIS, Atkinson. A very fine species, discovered at Darjeeling by Mr. Atkinson. It can be distinguished from the other species by its small size, and its wings, which are spotted with maroon. Nothing is known of its economy.—Capt. Hutton.

ATTACUS ATLAS, Linn. The largest of the silk-producing

Bombyces; common at Mussoorie, at an elevation of 5500 feet, and in the Dehra Doon; it is also found in the deep valleys of the surrounding hills; common also at Almorah, where the worm lives on the Kilmorah or *Berberis asiatica*, whilst at Mussoorie it never attacks that shrub, and lives exclusively on the foliage of *Falconia insignis*. The worm of this species is probably easier to rear than all the other species of wild Bombyces. It produces a very large cocoon, which is rich in silk, and of a greyish colour. *Attacus atlas* is also common at Cachar, in Sylhet, at Akyab, in Arrachan, and in China (note of Capt. Hutton). It is spread all over India, the Island of Ceylon, China, Burmah, and other parts as far as Singapore at the extremity of the Malay Peninsula; it is also found at Java, Borneo, and probably in all the other islands of the Indian Ocean. The different races vary in size and colour; the cocoons also vary in size and colour. The larva is polyphagous. In Ceylon it is said to prefer cinnamon (*Laurus cinnamomum*) and *Milnea roxburghiana*, but it is found also on many other trees. In Europe it has been bred on barberry (*Berberis vulgaris*); it can also be bred on apple, willow, hornbeam, and other trees and shrubs. In 1881, I bred it in London on Ailanthus in the open air till the third stage. It could not be reared in the open air till the formation of the cocoon, except in southern parts. It can be reared in captivity, but not so easily as the note of Captain Hutton would lead one to suppose. The larva of *Attacus atlas*, like that of *A. cynthia*, is entirely covered with a secretion forming a kind of white flour, which can be easily rubbed off. *Attacus atlas* and *A. cynthia* have some features of resemblance, and the larvæ have been found living together on barberry in the province of Kumaon.

ATTACUS EDWARDSII, Moore. A dark race of *atlas* discovered at Darjeeling.

(To be continued.)

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

BY ARTHUR G. BUTLER, Ph.D., F.L.S., &c.

(Continued from p. 257.)

ZETHES, Ramb.

Z. quatiens, Walk., is an *Ephyrodes*; *Z. xylochroma*, Walk., is a true *Zethes*, but identical with *Marmorinia shivula*, Guen.

Zethes hesperioides.

Zethes hesperioides, Guenée, Noct. 3, p. 330, n. 1795 (1852).

Z. hæsitans, Walker, Lep. Het. xv. p. 1524, n. 4 (1858).

Z. umbrifera, Swinhoe, Trans. Ent. Soc. 1890, p. 253, n. 461.
Java and Burmah. Types in Coll. B. M.

Section SARACA, Walk.

Zethes perturbans.

Zethes perturbans, Walker, Lep. Het. xv. p. 1525, n. 6 (1858).
Egnasia trimantesalis, Walker, l. c., xvi. p. 220, n. 6 (1858).
Silhet, Japan, Chusan Island. Types in Coll. B. M.
Deva? inornata, Walk., belongs to this section of *Zethes*.

PANGRAPTA, Hübn.

Pangrapta decoralis.

Pangrapta decoralis, Hübner, Exot. Zutr. p. 18, n. 46, figs.
91, 92.

Marmorinia epionoides, Guenée, Noct. 3, p. 371, n. 1853 (1852).

M. geometroides, Guenée, l. c., n. 1854 (1852).

Pangrapta elegantalis, Fitch (*teste* Grote, Check-List, p. 42).

Thyridospila recusans, Walker, Lep. Het. Suppl. 3, p. 1970
(1866).

Georgia, New York, &c. In Coll. B. M.

Guenée and Walker were quite ignorant of Hübner's description and figure of this species; the former founding his genus *Marmorinia* for the reception of two Indian species, one of which (*M. shivula*) is a typical *Zethes* = *Z. xylochroma*, Walk., and two varieties of *Pangrapta decoralis*.

The allied genus *Egnasia* differs chiefly in its simple antennæ; two synonyms may be recorded, viz.:—*Egnasia caduca*, Swinh., from Poona, is a female of *E. accingalis*, Walk.; and *E. euphrona*, Swinh., also from Poona, is a small example of *E. participalis*, Walk. *Thyridospila? vicaria*, Walk., from Congo, belongs to *Egnasia*.

DAGASSA, Walk.

This genus includes *D. eupithecioides*, Walk., *D. juruana* and *D. vulgaris*, Butl., *D. marginata*, Warr., *Apphadana liturata*, Walk., and *Thermesia croceiceps*, Walk. All the species occur in South America.

EUTHERMESIA, gen. nov.

Antiblemma, Grote (not Hübner).

The type of Hübner's genus is a species from Java, with obliquely porrected palpi, having the third article acuminate; whereas in the present genus the palpi are angulated and compressed, the third article (excepting at the tip or distal extremity) broadly triangularly expanded at the back, by the addition of a dense crest of gradually lengthening scales. The pattern of the wings and the variability of the species are almost the same as in *Thermesia*.

Euthermesia inexacta.

Thermesia inexacta, Walker, l. c., Suppl. 3, p. 1038 (1865).

T. funesta, Walker, l. c., p. 1040 (1865).

T. alacris, Walker, l. c., p. 1041 (1865).

T. conficita, Walker, l. c., p. 1042 (1865).

T. saturata, Walker, l. c., p. 1043 (1865).

T. adjuncta, Walker, l. c., p. 1046 (1865).

Antiblemma canalis, Grote (see Check-List, p. 42, n. 1295).

North and South America. Types in Coll. B. M.

There is not the least question as to the identity of the above supposed species, in all of which the same pattern is repeated, with variations of ground tint, greater or less definition in markings, and white, yellow, or black reniform spot; the most dissimilar forms occur together. The above synonymy will probably have to be increased when the Saundersian types are known. *Renodes latirena*, Guenée, may be also this species.

ISOGONA, Guen.

Massava, Walk., and *Eutoreuma*, Grote.

Isogona natatrix.

♂ *Isogona natatrix*, Guenée, Noct. 3, p. 323, n. 1786 (1852).

♀ *I. continua*, Guenée, l. c., n. 1787 (1852).

♀ *Massava scissa*, Walker, Lep. Het. Suppl. 3, p. 1110 (1865).

♀ *Eutoreuma tenuis*, Grote (see Check-List, p. 41, n. 1291).

♂, ♀. North and South America. In Coll. B. M.

Walker describes his *M. scissa* as a male, but it is unquestionably a female. We have the male from Espiritu Sancto, Brazil. Grote's specimens are both females, a little smaller than the Southern examples, but not otherwise differing.

PLUSIA, Ochs.

Plusia ni.

Noctua ni, Hübner, Eur. Schmett. Noct. pl. 58, fig. 284.

Plusia humilis, Walker, Lep. Het. xii. p. 915, n. 61 (1857).

P. extrahens, Walker, l. c., p. 929, n. 88 (1857).

P. significans, Walker, l. c., p. 930, n. 89 (1857).

Europe, Punjab, Darmsala, Campbelpore, Chekiang, Japan, Aden, St. Vincent, St. Domingo. In Coll. B. M.

Grote quotes *P. brassicae* of Riley as a synonym of this species, but it is far nearer to *P. u-aureum*; as a matter of fact, *P. labrosa* is much nearer to *P. ni* than *P. brassicae* is, but the species are all quite distinct.

Plusia daubei.

Plusia daubei, Boisduval, Ind. Méth. p. 159, n. 1281;

Duponchel, Suppl. 3, p. 486, pl. 42, fig. 1.

P. indicator, Walker, Lep. Het. xii. p. 922, n. 74 (1857).

P. ciliaris, Walker, *l. c.*, p. 928, n. 86 (1857).
Europe, India, and West Africa. In Coll. B. M.

Plusia argentifera.

Plusia argentifera, Guenée, Noct. 2, p. 352, n. 1186 (1852).

P. secundaria, Walker, Lep. Het. xii. p. 933, n. 95 (1857).

Australia and Tasmania. In Coll. B. M.

Walker selected a dwarfed male of this widely distributed and abundant Australian species as the type of his *P. secundaria*.

Plusia basigera, Walker, is *P. laticlavata*, Morrison; I do not know which name has priority.

Plusia agramma.

Plusia agramma, Guenée, Noct. 2, p. 327, n. 1136 (1852).

P. inchoata, Walker, Lep. Het. Suppl. 3, p. 841 (1865).

Java, Japan, Ceylon, Canara, and Australia. Types in Coll. B. M.

Plusia chrysitina.

Phalæna (*Noctua*) *chrysitina*, Martyn, Psyche, pl. 25, fig. 56 (1797).

Noctua aurifera, Hübner, Eur. Schmett. Noct. pl. 98, fig. 463.

Madras (*Martyn*), Asia, and Africa. In Coll. B. M.

P. orichalcea, Fabr., has been confounded with this species; it however differs in its slightly broader primaries, on which the brassy patch is decidedly broader, more regularly sinuated internally, and not produced nearly so far towards the base. This patch, therefore, answers more closely to the Fabrician description,—“*anticæ macula lunari, orichalcea, nitida.*” His locality is “India”; we have it from the Nilgiris, Ceylon, and Japan. It stands between *P. chrysitina* and *P. chrysitis*.

Plusia chrysitis.

Phalæna chrysitis, Linnæus, Syst. Nat. x. p. 513.

Plusia nadeja, Oberthür, Etudes, 1880, p. 84, pl. 3, fig. 10.

Japan and Europe. In Coll. B. M.

M. Oberthür says that the metallic green in his species extends nearer to the base and farther towards the outer margin than in *P. chrysitis*; but these differences are not constant. Our brassy Japanese specimens bear out the second distinction, but the greener ones do not. As *P. chrysitis* varies more in the extent of the metallic area than in any of its allies, such differences have no weight as specific characters. Any lepidopterist who compares Russian and Japanese examples must be convinced at once that they are not distinct species.

Plusia festucae.

Phalæna festucae, Linnæus, Syst. Nat. x. p. 513.

Plusia putnami, Grote (see Check-List, p. 34, n. 847).

Europe, Japan, and United States. In Coll. B. M.

I fail to see any reason for separating American specimens from those of Europe; perhaps in a long series there may be more starved specimens from the States than from Europe, and the silvery subapical streak in the former is more frequently narrow than in the latter. The Japanese examples, as a fact, differ more, the metallic markings being larger and more prominent than in European specimens; but individuals differ quite as much from one another. Without constancy no distinction is worth consideration.

Plusia verruca.

Noctua verruca, Fabricius, Ent. Syst. 3, 2, p. 81, n. 238 (1794).

Plusia rutila, Walker, Lep. Het. Suppl. 3, p. 837 (1865).

United States, Jamaica, Venezuela, Bogota. In Coll. B. M.

It is highly probable that Walker's and Fabricius' types were from the same locality.

Plusia striatella, Grote, is *P. venusta*, Walk., but I do not know which name was first published.

Walker's (supposed European) specimens of *P. u-aureum* are undoubtedly *P. brassicæ*, Riley, and therefore have nothing in common with the true *P. u-aureum* of America. I must say I greatly doubt the original locality for the latter species, which is certainly not a variety of *P. interrogationis* as suggested by Dr. Staudinger, being more nearly allied to *P. octoscripta*.

Plusia bractea.

Phalæna bractea, Schiffermüller, Wien. Verz. p. 314.

Var. *Plusia excelsa*, Kretschmar, Berl. Ent. Zeit. 1862, p. 135, pl. 1, fig. 5.

Plusia metabractea, Butler, Trans. Ent. Soc. 1881, p. 190, n. 75.

Europe and Japan. In Coll. B. M.

With our present series I find it impossible to maintain the distinctness of *P. excelsa* = *metabractea* as a species. *Plusia octoscripta*, Sanborn, is *P. falcigera*, Walker, but certainly not Kirby's *P. falcifera*, which must be either *P. pasipheia* or an allied species; the description is so bad that nobody can possibly decide the point without seeing the type. *P. rectangula*, Kirby, is unquestionably Guenée's *P. simplex*, which it will supersede; it is quite evident that Kirby called the inner margin of the primaries *costal*, as describers of Micro-Lepidoptera at the present time call it *dorsal*.

Plusia ignea, Grote, is regarded by its author as a synonym of *P. alticola*, Walk. The species labelled as "*P. alticola*," and which therefore I presume to be *P. ignea*, is quite distinct from Walker's insect, which is more nearly allied to, though distinct

from, *P. devergens*, and may (I think) prove to be the *P. devergens* of American lists. It differs from the European species in its much less strongly dentated submarginal line, wider central belt, and less oblique V-shaped central marking on primaries, and decidedly broader black marginal belt on secondaries. Grote's *P. alticola* = *ignea* is nearer to *P. hochenwarthi*, from which it chiefly differs in its much superior size.

Plusia virgula.

Plusia virgula, Blanchard, in Gay's 'Fauna Chilena,' vii. p. 84, n. 2 (1854).

P. certa, Walker, Lep. Het. xii. p. 920, n. 70 (1857).

Triphæna signata, Philippi, Linn. Ent. xvi. p. 293 (1860).
Chili. In Coll. B. M.

Mr. Hampson has pointed out to me that the genera *Risoba* and *Pitrasa*, hitherto placed near *Thyatira* (on account of their general resemblance to that genus), are actually *Plusiidæ*; *Risoba* will stand next to *Plusia*, which should terminate with *P. thyatiroides*; next to *Risoba* should come *Leptina*, followed by *Pitrasa* and *Plusidia*. The type of the last-mentioned genus is *P. abrostoloides* = *Plusia cheiranthi*, Tausch.

(To be continued.)

NOTES AND OBSERVATIONS.

ACHERONTIA ATROPOS: NOTES ON LARVA.—The larva of this moth is unusually abundant here this year, and full-fed specimens were brought to me about the middle of July. In a garden near here it was noticed on the potatoes, and was feared as being probably an invasion of locusts! Five specimens brought to me from this garden illustrated three well-marked varieties, though the dimorphic dark form of the larva was not among them. Three of them belonged to the here usual greenish-yellow form with moderately distinct violet-purple oblique stripes. One, however, was a pure green variety with the stripes very faint, and at first sight reminded one of the privet hawk moth caterpillar. The third variety was very beautiful, being yellow, with the oblique stripes very extensive, definite, and deep-coloured. This individual exhibited a remarkable peculiarity, inasmuch as on the second abdominal foot of the left side there was no trace whatever of any of the clasping hooks; the leg seemed in other respects quite normal, and all the other legs had their full complement of hooks, these structures being in this species numerous and large. This specimen had received some injury near the anus, and I am sorry to say was attacked with diarrhoea and died, so that I had no opportunity of ascertaining whether there might be a repair of the deficiency at the last moult, which possibly (but not certainly) had not taken place in this individual. While examining it after death (or after apparent death), when flaccid, discoloured, and shrunk to about half its normal size, and lying on its side on blotting-paper an

apparent corpse, without reaction to pressure by my fingers, a house fly alighted on it and walked over it, whereon the skin was thrown into violent contraction; a striking instance of the independence of the life of parts of the insect organisation.—D. SHARP; August 1st, 1896.

TRIPHÆNA SUBSEQUA SPECIFICALLY DISTINCT FROM T. ORBONA.—Mr. Nash (*ante*, p. 262) asks, Is *Triphæna subsequa* in a true sense a distinct species from *T. orbona*? The reason for his question apparently being a statement he makes that "A well-known local collector in the forest (*i.e.* the New Forest) told me that he had obtained ova from *subsequa*, and therefrom bred *subsequa* and *orbona* intermixed, pointing out at the time the specimens." I assume of course that the species intended are *subsequa*, Hb., and *orbona*, Fb., as the names are used in Doubleday's list, and without wishing for one moment to throw doubt upon the *bona fides* of this worthy collector, whoever he may be, I would venture to say that there is some great mistake here. That such mistakes will happen I know full well, having myself been the victim of one of a similar nature, which happened in this way. Some few years since, when both these species were occurring pretty freely at sugar, together with a sprinkling of *T. pronuba*, a collector, than whom I know no keener, sent me some ova labelled *subsequa*, together with a note saying that he was glad to be able to send me these ova, as I should see, as the larvæ grew, how very different they were from *orbona*; the eggs duly hatched, and the larvæ grew apace, and it was very soon apparent that they were not *subsequa*, but in due course produced a very fine lot of *pronuba*. The only explanation that I have ever been able to obtain is that "the *pronuba* eggs must have been in the box when the *subsequa* was put in it," and I suppose the latter did not lay. Is it not possible that something of this sort may have happened in the case of the New Forest brood? There can, I think, be no doubt as to the title of *subsequa* to specific rank; not only is the mark (the black spot on the costa) by which we are accustomed to distinguish it in the imago stage very constant, but, compared with *orbona*, the shape of the wings appears to me to be very different. In the larval stage the conspicuous ochreous dorsal line and accompanying rows of quadrangular black spots distinguish *subsequa* at once from the other more sombrely marked members of the genus.—ROBERT ADKIN; Lewisham, August, 1896.

PLUSIA CHRYSITIS: THE BANDED FORM.—Mr. Kane, in his useful and interesting Catalogue of the Lepidoptera of Ireland (*ante*, p. 213), falls into an error in his reference to this form of *P. chrysitis*. I take the banded form commonly enough about Chester, although not so frequently as the one usually regarded as the type, in which the median brown band of the primaries is more or less broken. Newman did not find the banded form rare, as will be seen from the following ('British Moths,' p. 452):—"Their colour" (fore wings) "is metallic golden-green, with a brown blotch at the base, another and larger brown blotch at the middle of the costal margin, and a third opposite this on the inner margin; in some of my specimens the costal and inner-marginal blotches unite in forming a median band."—J. ARKLE; 2, George Street, Chester.

LEUCANIA STRAMINEA.—In Buckler's work on 'The Larvæ of British Butterflies and Moths' it is stated, with reference to the larvæ of this species, that a large proportion of them are generally ichneumonated. I cannot quote the exact words, as I have not the volume with me. But in June last I took sixty-four of the larvæ, which in due course spun up and changed to pupæ. Before leaving home to take part in the naval manœuvres, I had to cut the cocoons off the muslin and from the reed stems upon which they had spun up, and I only found two of them ichneumonated. These I sent to my friend Bignell, and the others, with the exception of two sent to another friend, I brought on board with me, and from these I bred fifty-eight perfect insects and two cripples. From this it would appear that the species, at any rate in the neighbourhood of Dovercourt, where the larvæ were taken, is singularly free from the attacks of parasites, and, moreover, is not a very delicate one, as some of the cocoons were rather roughly handled, and all had a deal of shaking about. May I here take the opportunity of informing many friends and correspondents that I have just been appointed to H.M.S. 'Hawke' on the Mediterranean station, and in consequence shall not be able to carry into effect many of the promises I made last season with respect to exchanges this. I am very sorry, and hope to be forgiven, but it cannot be helped.—GERVASE F. MATHEW; H.M.S. 'Apollo,' Sheerness, August 7th, 1896.

ENEMIES OF HUMBLE BEES.—I was much interested in Mr. W. W. Smith's note in the July number of the 'Entomologist' on the enemies of humble bees in New Zealand (*ante*, p. 210). Years ago, on the prairies of Illinois, I used frequently to see *Bombus vagans*, Smith, and *B. virginicus*, Oliv., captured and killed by one, and I think two species of *Asilus*, but am at present unable to give the specific names of these. Doubtless *Bombus pennsylvanicus*, DeG., which is also common on these prairies, though a larger species, often meets the same fate. The flies pounce on their prey, and at the same instant thrust their stout beak into their victim. If the head of the bee is deeply immersed in a flower, the abdomen is punctured, but if the bee happens to be nearly or quite exposed, and especially if occupied with small blossoms situated on a vertical stalk, the thorax is pierced. In any case, the attack is followed so quickly by the thrust that the victim appears to die almost without a struggle, the captor generally sucking its juices before flying away. The *Asilus* are rather fearless, and with caution one may watch them in exposed situations engaged in their murderous work.—F. M. WEBSTER; Ohio Agricultural Experiment Station, Wooster, Wayne County, Ohio, U.S.A., July 24th, 1896.

COLLECTOR V. ENTOMOLOGIST.—Some little time ago I noticed in the magazine some remarks which seemed to imply that no one was worthy of the name of entomologist who did not make his collecting entirely subservient to the elucidating of scientific problems. This seems to me somewhat rough upon the ordinary collector. It is not everyone who has the necessary aptitude or training for investigating the questions with which science deals, nor have many people the leisure for this purpose; but surely everyone can admire a beautiful object

when he sees it, and it will be to him the more lovely when he has obtained it by his own exertions. Is it not then somewhat ungracious to discourage those whose only object is to obtain a more intimate knowledge of the external appearance of the wonders of creation, though they may not apply that knowledge to the deducing of general laws? As though one should say that a man ought not to form a collection of pictures, unless he can work out from them the true principles of painting; or to pick up shells on the shore, unless he can so clear up some problem in conchology. But even a "mere collector" may have his use, for may not his collection, properly labelled, form part of the basis on which the scientific superstructure may be raised by others? I make these few remarks in the hope that someone more competent than myself, perhaps the Editor in person, may say a word on behalf of the ordinary collector, which with some shamefacedness I must avow myself to be, and tell us whether he is indeed to be put down with scorn and derision, or may, as I hope, still have a brotherly hand extended to him by those of greater attainments, but perhaps of no greater love for entomology.—Rev. W. CLAXTON; Woolston, Southampton, August 4th, 1896. [As an entomologist is one who studies the habits, &c., of insects, and as a collector of insects, in order to obtain species, studies their habits and life-histories, it follows that a collector can justly claim to be an entomologist. Entomologists may be roughly divided into two classes—(a) the practical, (b) the scientific. Speaking in a general way, class a, which, by-the-bye, is far the largest, is to a very great extent quite independent of class b; whilst students in the latter class are often indebted for material to those who labour in the former. There is, however, no hard and fast boundary-line between the two classes; very many expert practical entomologists in this country are distinctly scientific in their work, and several eminent scientific entomologists are adepts at field work. As this subject has been brought forward, it is to be hoped that our readers will favour us with their views thereon.—ED.]

NOTE ON *POLIA XANTHOMISTA* var. *NIGROCINCTA*.—Is it usual for a portion of the ova of *P. nigrocincta* to hatch out in the autumn, and the rest remain over until the following spring? I have now been collecting many *nigrocincta* larvæ each season for more than twenty years. At the beginning of June, 1895, I took a fair quantity, full-fed, but was obliged to go away at the latter end of August for ten days. On my return, I found many of the moths had emerged, and spoiled themselves of course. Not thinking anything about ova until the end of November when I came to clear out the large flower-pot they had been in, I found to my astonishment, on the cloth covering the top of the pot, a quantity of eggs, a great portion of which had hatched, and the larvæ had disappeared. The rest I took great care of, and in the spring following the larvæ hatched out.—JOHN THORPE; Cheapside, Middleton, near Manchester, July 16th, 1896.

CAPTURES AND FIELD REPORTS.

VANESSA C-ALBUM IN SALOP.—Two specimens of *V. c-album* were taken in my garden on August 3rd.—(Rev.) CHARLES F. THORNEWILL; Calverhall Vicarage, Whitchurch, Salop, Aug. 17th, 1896.

EUCHLOË CARDAMINES IN AUGUST.—On August 2nd I saw a male specimen of *E. cardamines*, flying in Tiddington Lane, between Thame and Oxford. It appeared to have just emerged.—J. W. SHIPP.

ACHERONTIA ATROPOS IN LINCOLNSHIRE.—Five full-grown larvæ of *A. atropos* have been brought to me this year, and I have heard of others having been taken.—W. LEWINGTON; Market Rasen, Aug. 14th, 1896.

ACHERONTIA ATROPOS IN HERTS.—On Aug. 4th I received a single larva of this species from a friend living at Elsenham, near Bishop Stortford.—F. CORNELL; 14, Wellesley Road, Leytonstone, E.

ACHERONTIA ATROPOS IN CO. WATERFORD, IRELAND.—A specimen, or rather the remains of what was once a specimen, of *A. atropos* was brought me dead by the gardener to-day (Aug. 6th). It was taken at rest in a potato field near Ballindud a few days previously. Is not August an unusual month to meet with this insect?—L. H. BONAPARTE-WYSE; Manor of St. John's, Waterford. [Unusual but not exceptional.—ED.]

ACHERONTIA ATROPOS IN SALOP.—A full-grown larva of *A. atropos* was brought to me on Aug. 13th from a neighbouring village, where it was found crawling across a path, and is now safely ensconced under ground.—(Rev.) CHARLES F. THORNEWILL; Calverhall Vicarage, Whitchurch, Aug. 17th, 1896.

COLEOPTERA AT CIRENCESTER.—On August 3rd I took two specimens of *Ptilium affine* amongst rubbish in a garden at Cirencester. With them I also found *Ptenidium evanescens* and *Acritus minutus*.—J. W. SHIPP.

AGROTIS ASHWORTHII.—On July 20th last I captured a specimen of this moth in the Sychnant Pass, between Conway and Dwygyfylchi. I should be glad to know if many specimens of this insect have been taken in recent years.—B. HARVEY-JELLIE, B.A.; 61, Tyrwhitt Road, St. John's, S.E., Aug. 15th, 1896.

[Mr. Tait (Entom. xxviii. 233) records the capture of eight specimens early in July, 1895. The species is probably bred each year from larvæ collected in the Penmaenmawr district.—ED.]

PLUSIA MONETA IN HERTFORDSHIRE.—My brother and I took eight specimens of *P. moneta* near Tring, during the last week of June and the first week of July this year. They were hovering around and settling on the flowers of monkshood. Several were in splendid condition.—J. W. SHIPP; August, 1896.

PLUSIA MONETA IN KENT.—Two specimens of *P. moneta* have been taken near here this July. One at Ashford, by Mr. Lewis, on a carnation blossom; and another, at light, near Wye.—F. V. THEOBALD, Wye, Kent.

ACRONYCTA ALNI AND APLECTA OCCULTA IN LINCOLNSHIRE.—I have beaten two larvæ of *Acronycta alni* this year; one at Hartsholme, near

Lincoln, Aug. 3rd, the other near Market Rasen, on the 12th of the same month. At sugar, on the night of Aug. 12th, I had the pleasure of taking a pair of *Aplecta occulta* for the first time in this locality.—W. LEWINGTON; Market Rasen.

PARNASSIUS APOLLO IN THE PYRENEES.—I am finding this handsome butterfly here in abundance, both on the French and the Spanish sides of the range. It occurs between the altitudes of 2000 and 6000 feet, which thus approximates very closely with its vertical distribution in the Alps, allowance being made for the difference of latitude.—W. HARCOURT-BATH; St. Sauveur, Hautes-Pyrénées, July, 1896.

ABERRATIONS OF ARGYNNIS PAPHIA AND LIMENITIS SIBYLLA.—From June 29th to July 10th my brother and myself were collecting in the New Forest, and during that time we captured and saw most of the species mentioned by Mr. Nash (*ante*, p. 261). Among the *A. paphia* we took was an interesting variety of the male, in which the spots are confluent, forming a broad bar on fore and hind wings. We heard of several (about six) dark varieties of *L. sibylla* being taken. One male example of *Boarmia abietaria* was also secured, and a female specimen of *Lasiocampa quercifolia* was given to me by a boy, who had found it just emerged from the chrysalis.—F. L. BLATHWAYT; Bromyard, Aug. 4th, 1896.

ABUNDANCE OF CHEROCAMPA PORCELLUS.—Referring to the note by Mr. C. J. Nash on *C. porcellus* (*ante*, p. 264), I may say that the species has been most abundant here. On four nights I took on honeysuckle and valerian some fifty specimens, though not more than one-tenth were sufficiently good to kill. I generally get two to four specimens in the year, but this year I have no doubt if I had tried I could have netted two hundred easily, but I did not bother to take them when I found them so worn. The honeysuckle was not sufficiently out to visit till June 4th, when the majority of some fifteen specimens boxed were useless. I may add that I found two larvæ of this species, three-parts fed, on *Galium verum*, on the night of June 21st.—W. B. THORNHILL; Castle Cossey, Castle Bellingham, Ireland, July 30th, 1896.

NOTES FROM NORTH WALES.—During a three weeks' visit to N. Wales, at the end of May and beginning of June, I found insects unusually plentiful. More than 160 different species of Macro-Lepidoptera were met with, although "sugaring," except at the sandhills, was very unproductive. The following are some of the species noticed:—*Pieris brassicæ*, *P. rapæ*, *P. napi*, all abundant.—*Euchloë cardamines*, plentiful.—*Argynnis selene*, plentiful at Tan-y-bwlch, Merionethshire, by May 30th.—*A. euphrosyne*, worn, May 24th.—*A. aglaia*, *A. adippe*, just beginning to appear at Barmouth, June 12th.—*Melitæa aurinia*, abundant in several localities near Tan-y-bwlch and Barmouth, quite fresh, May 26th; of about seventy specimens taken that day only two were females.—*V. urticæ*, *V. io*, larvæ of the former species very abundant; the first of a batch of larvæ of the latter taken at Barmouth pupated June 14th, and the first imago appeared July 9th.—*Pararge egeria*, a few taken at Barmouth.—*P. megara*, very abundant.—*Satyrus semele*, just beginning to appear June 7th.—*Epinephele ianira*, plentiful.—*Cænonympha typhon*, June 6th, abundant on a large bog near Tan-y-bwlch; the form I took is similar to *typhon* from the South of Scotland and from Ireland.—*C. pamphilus*, abundant.—*Thecla*

rubi, generally distributed.—*Polyommatus phlœas*, abundant.—*Lycæna ægon*, abundant in one locality in Carnarvonshire by June 7th.—*L. icarus*, abundant.—*L. argiolus*, one worn specimen at Tan-y-bwlch, May 30th.—*Nemeobius lucina*, took three worn specimens, May 29th, two of them being only fit to be released again. My friend Mr. W. J. Kerr took me to a valley in Merionethshire where he met with this species many years ago, and it was pleasing to find it still in existence.—*Nisoniades tages*, abundant.—*Hesperia sylvanus*, very plentiful.—*Sphinx convolvuli*, I learnt from my friend Mr. Kerr that this insect was fairly numerous at Barmouth last autumn, he having taken several specimens at flowers of the tobacco-plant.—*Chærocampa porcellus*, I saw one specimen at Barmouth, but failed to capture it.—*Macroglossa bombyliiformis*, an insect more easily seen than taken; we captured ten specimens altogether, but they seem to spoil themselves very soon after emergence.—*Ino statice* occurred in many localities.—*Zygana pilosella*, this interesting species was still plentiful in its old haunts where I had taken it in 1891 and 1893; my friend Mr. F. C. Woodforde was the first to find the cocoon, which is not exposed like that of *Z. filipendulæ*, but hidden away deep down amongst the stems of heather and grass, and sometimes fastened on to stones.—*Z. filipendulæ*, very plentiful; out by May 24th.—*Hylophila prasinana*, Tan-y-bwlch.—*Setina irrorella*, one at Tan-y-bwlch.—*Lithosia mesomella*, *Euchelia jacobæ*, *Nemeophila russula*, *N. plantaginis*, *Arctia caia*, *Spilosoma lubricipeda*, *S. menthastri*, *Hepialus humuli*, *H. velleda*, *H. lupulinus*, *H. hectus*, *Dasychira pudibunda*, Barmouth and Tan-y-bwlch.—*Cossus ligniperda*, one freshly-emerged female taken at sugar.—*Porthesia similis* and *Bombyx neustria*, larvæ very common.—*B. rubi*, *B. quercus*, *Odonestis potatoaria*.—*Saturnia pavonia*, several broods of larvæ met with.—*Drepana falcatoria*, *Cilix glaucata*, *Acronycta psi*.—*A. rumicis*, plentiful at sugar.—*Leucania lithargyria*.—*L. littoralis*, Barmouth.—*L. comma*, *L. pallens*.—*Axylia putris*, one taken at Barmouth by my friend Mr. Meynell.—*Xylophasia lithoxylea*.—*Mamestra albicolon*, plentiful at sugar at Barmouth.—*Miana strigilis*, *M. fasciuncula*.—*Grammesia trigrammica*, a fine variety, with suffused dark colouring on upper wings, taken at Barmouth.—*Caradrina morpheus*, *Rusina tenebrosa*.—*Agrotis vestigialis*, Barmouth.—*A. suffusa*, *A. corticea*.—*A. ripæ*, Barmouth.—*A. cursoria*, four at Barmouth.—*A. strigula*.—*Agrotis ashworthii*, from larvæ taken in Flint at the end of April the first imago appeared on June 17th; my friend Mr. Woodforde and I went to hunt for these larvæ April 27th to 29th, and found, contrary to what appears in the text-books, the larvæ feed freely and crawl about on their food-plants, rock cistus, &c., in the daytime, as well as at night. The traditional method of finding these larvæ by turning up stones is a very slow and tedious method of acquiring them. In captivity they feed freely on primrose and dandelion flowers, as well as on sallow catkins.—*Mania maura*, at sugar.—*Dianthæcia nana*, one wing in a spider's web.—*Hecatera serena*, one taken by Mr. Meynell.—*Aplecta advena*, one taken at sugar at Barmouth, and another seen.—*H. adusta*, abundant at Barmouth.—*H. oleracea*, *H. pisi*.—*H. contigua*, four at sugar at Barmouth.—*Cucullia umbratica*, abundant.—*Gonoptera libatrix*.—*Habrostola tripartita*, *H. triplasia*.—*Plusia festuæ*, *Anarta myrtilli*, *Heliaca tenebrata*, *Erastria fasciana*, *Bomolocha fontis*.—*Venilia macularia*, abundant and generally distributed.—*Eurymene dolobraria*, two at Tan-y-Bwlch.—*Selenia lunaria*, *Amphidasys betularia*, *Tephrosia crepuscularia*, *T. punctularia*, *Pseudoterpnæ pruinata*, *Iodis lactearia*.—*Acidalia contiguaria*, I took one

specimen of this interesting little Geometer on June 7th in Carnarvonshire.—*A. marginepunctata*, *A. subsericeata*, *A. fumata*, *Bapta temerata*.—*Strenia clathrata*, Tan-y-Bwlch.—*Bupalus piniaria*.—*Larentia cæsiata*, taken on June 3rd; surely a very early date?—*Emmelesia albulata*, very abundant.—*E. decolorata*, *Eupithecia pulchellata*, *E. nanata*, *E. absinthiata*, *E. pumilata*.—*Lobophora viretata*, one at Tan-y-bwlch.—*Melanippe hastata*, *M. tristata*, *M. sociata*, *M. galiata*.—*Anaitis plagiata*, very plentiful.—*Tanagra atrata*, very plentiful at Barmouth.—*Enrychia cingulata*, very abundant.—*E. octomaculata*, plentiful on the railway line near Penrhyn-deudraeth railway station; one or two seen in other places.—*Botys fuscalis*, plentiful. The above list will, I think, show that North Wales is by no means a bad collecting-ground for the entomologist.—E. W. H. BLAGG Cheadle, Staffordshire, July 21st, 1896.

EARLY APPEARANCES OF LEPIDOPTERA IN 1896.—I was in the Lake District this year from May 25th to June 8th, and found some species out unusually early. This was notably the case with *Cænonympha davus* (*typhon*), of which I took several specimens on the Holker mosses on May 30th. The species was well out in the same locality on June 1st, and it simply swarmed at Witherslack on June 3rd, where in an hour and a quarter I captured and boxed sixty-seven specimens. On May 25th I found *Argynnis selene* well out near Lakeside, Windermere; and *A. euphrosyne*, males, were practically over, though the females were still in very good condition and extremely abundant. I took three nice pale varieties of this species. On May 28th I saw several *Zygæna filipendulæ* on the railway embankment at Grange, and on the same day took at Witherslack a nice series of *Procris geryon* and a few *Lycæna agestis* var. *salmacis*. This latter species was very abundant a week later. On May 30th *Hydrelia unca* was well out on the Holker mosses; and on June 1st and 3rd I obtained respectively *Aspilates strigillata* and *Acidalia fumata*. I took a number of other species, but their time of appearance was about normal.—B. H. CRABTREE; The Oaklands, Levenshulme, Manchester, July 23rd, 1896.

SOCIETIES.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—July 23rd, 1896.—T. W. Hall, Esq., F.E.S., Vice-President, in the chair. Mr. West (Streatham) exhibited specimens of *Catocala promissa* and *C. sponsa*, bred from larvæ taken during the Society's field-meeting at Whitsuntide. Mr. Robt. Adkin, a bred series of a *Hypsipetes*, bred from larvæ taken in Orkney by Mr. McArthur. He was unable to say whether they were *H. trifasciata* or *H. ruberata*, although he was inclined to think they were referable to the latter species. He also exhibited a specimen of *Cænonympha pamphilus*, with the row of ocelli on the under side very well developed. Mr. Dennis, a series of under sides of *Cupido minima*, taken at Horsley, showing a complete gradation in the number and development of the spots, and also one upper side well scaled with blue. Mr. Fremlin, specimens of *Polyommatus astrarche* var. *salmacis*, from Castle Eden Dene. Mr. Mansbridge, varieties of *Abrazas grossulariata*, bred from

larvæ obtained at Horsforth. Out of 150 larvæ two or three per cent. only showed more than ordinary variation, compared with some fifteen per cent. last year from the same locality. Two specimens were asymmetrical, and one was a nicely radiate form. Mr. West (Greenwich) exhibited specimens of the hemipteron *Dicyphus epilobii*, from Eltham. Mr. Moore, a specimen of the second brood of *Cyaniris argiolus*, taken on July 12th, at Oxshot; and also a specimen of *Lycæna ægon*, destitute of the row of fulvous blotches on the upper surface, and one having confluent spots on the under side. Mr. Robt. Adkin contributed a paper entitled "Notes and Observations made during the Society's Field Meeting at Chalfort Road, on July 18th, 1896."

August 13th.—C. G. Barrett, Esq., F.E.S., Vice-President, in the chair. Mr. S. Stevens exhibited an unusually small specimen of *Papilio machaon*, having the black band on the hind wing very narrow. Mr. R. Adkin, a bred series of *Pachnobia hyberborea*, from pupæ taken at Rannoch. Mr. McArthur, a preserved larva of the same species, mounted on a twig of its food-plant (*Empetrum nigrum*), the crowberry, and gave interesting details as to its life-history. Mr. Fremlin, a series of *Phigalia pedaria*, from Saltash, including the dark reticulated form and the very dark uniform variety. Mr. H. Moore, numerous interesting insects from South Africa, including a fine specimen of *Actias mimosa*, which from its sluggish habits can be easily picked off the bushes; its larvæ are more or less gregarious; several species of the larger Orthoptera, *Pachytillus pardalinus*, the species which often appears in vast numbers and does considerable damage; *P. peregrinus*, which is the locust of N. Africa; *Cyrtacantus purpurifera*, a very large species; *Acheta africana*, a mole-cricket from Johannesburg; and numerous species of Coleoptera which are attracted in thousands to the electric light in Pretoria. Mr. Sauze, a specimen of *Cicada anglica*, one of three taken by Mr. Heasley, in Surrey. Mr. Heasley had been attracted to some oak trees by an unusual stridulation, and eventually succeeded in obtaining these three examples. Thus a doubt as to whether this species stridulates or not has been cleared up, there being no previous record of such in this country. Mr. West, of Greenwich, a series of the local hemipteron, *Eurygaster maura*, from Folkestone. Mr. Mansbridge, a double cocoon of *Clisiocampa neustria*, from which, although the imagines had emerged from the pupa-cases, they had been unable to extricate themselves. When cut open there was only one cavity partially divided into two. Mr. Barrett exhibited four British specimens of *Plusia ni*, two belonging to Mr. Jeffries and two to Mr. Briggs; one of the former was captured in Surrey. Also a fine variety of *Cleoceris viminalis*, having the basal half of the fore wings very dark, in contrast to the very pale outer portion; and a remarkable form of *Agrotis exclamationis*, in which neither of the stigmata was developed, but the elbowed and basal lines were very distinct and perfect on the uniformly pale brown ground colour. A discussion took place on the season, with especial reference to *Colias edusa*, and the means of migration of insects, Messrs. Stevens, McArthur, Adkin, Barrett, Mansbridge, Winkley, and others, taking part.—HY. J. TURNER, *Hon. Report Sec.*

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Duplicates.—Edusa (males), C-Album (a few), Valezina (5), Promissa. *Desiderata.*—Athalia, Blandina, Epiphron, Davus, Paniscus, and many others.—*C. H. Blathwayt; Frome Bank, Bromyard, Worcester.*

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Duplicates.—Artemis,* Paniscus, Mesomella, Salicis,* Monacha,* Ravida. *Desiderata.*—Myopiformis, Minos, Exulans, Meliloti, and other local insects.—*W. Lewington; King Street, Market Rasen.*

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Duplicates.—Argiolus (few), Bembeciformis,* Mesomella, Tincta* (few), Luctuosa, Notata (few). *Desiderata.*—Apiformis, Globulariæ, Cribrum, Mendica, Spilosoma, Urticæ, Orion, &c.—*F. C. Woodforde; Market Drayton, Salop.*

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Duplicates.—Ripæ, Albicollis, Littoralis, Affinis, Sinapis, Edusa, Argiolus. *Desiderata.*—Numerous; especially Unanimitis, Xerampelina, Fulvago. Oo, Pyralina, Pusillata, Constrictata, Campanulata, Succenturiata, Dodoneata.—*Rev. E. C. Dobrée Fox; Castle Moreton, Tewkesbury.*

Duplicates.—Pupæ of Strataria (Prodromaria) and Pavonia (Carpini). *Desiderata.*—Ova, larvæ, or pupæ of Porcellus, Elpenor, Fascelina, Gonostigma, Cratægi, P. Populi, B. Trifolii, Versicolor, Furcula, Bifida, Trepida, Ridens, Alni, Dolobrararia, Lunaria, Fuscantaria, Zonaria, Hispidaria, Roboraria, Consortaria.—*G. R. Garland; 94, Sedgwick Road, Leyton, Essex.*

Duplicates.—Paniscus, Exulans, Ashworthii,* Ravida, Cursoria, Plantaginis,* Conflua var. Thule, Hastata var. Hastulata,* Albulata var. Thule, Versicolora,* Humuli var. Hethlandica, Venosa,* Myricæ,* Falcu,* Depuncta, Ulmata,* Carbonaria, Hispidus, and many others. *Desiderata.*—W-Album, Pruni, Arion, Albipuncta, Straminea, Rubidata, Belgaria, Sinuata, Simulata, Coronata, Anomala (female); and offers.—*T. Maddison; South Bailey, Durham.*

Duplicates.—Croceago,* Berberata, Miata, Russata* (fine Cornish forms), Propugnata, Ornata, Badiata, Subfulvata,* Subumbrata, Assimilata,* Munitata, Variata, Loewii,* Spilodactyla,* Lienegianus,* Turionana,* Edusa,* Semele, Villica,* Adonis, Fibrosa vars., Galatea, Gracilis, Typhæ,* Rubricosa, Hirtaria,* *Desiderata.*—Very numerous; Diurni, Bombyces, and Noctuæ, to extend.—*W. G. Sheldon; Kirkstyles, Havelock Road, Croydon.*

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EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

ROBERT ADKIN, F.E.S.

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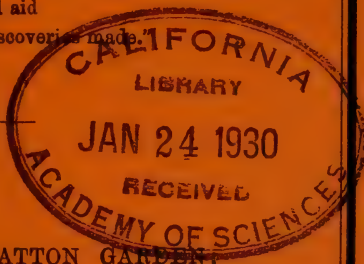
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SHOULD THE FORMATION AND ARRANGEMENT OF A COLLECTION OF INSECTS BE MADE SUBSERVIENT TO THE ELUCIDATION OF SCIENTIFIC PROBLEMS?

BY W. HARCOURT-BATH.

OUR worthy Editor (*ante*, p. 287) invites correspondence on this subject in connection with the communication by the Rev. W. Claxton (*ante*, pp. 286, 287), which affords me an appropriate opportunity for airing my opinions respecting a theme which has for some time past interested me considerably, and provided me with much food for contemplation. First of all permit me to dissent from the views expressed by Mr. South, to the effect that a collector must necessarily be an entomologist because he is compelled to learn something about the habits and economy of the insects for which he seeks. He may be no more an entomologist than a mere postage-stamp enthusiast can claim to be a geographer, although the latter, in the course of compiling his collection, in a similar manner manages to acquire a little knowledge about the various countries which issue those articles. Both find it to their advantage to learn as much as possible about the objects of their affections, but only of such a nature as shall assist them directly in their acquisition; and in many cases the information so obtained, as a necessary consequence, is not appreciated for its scientific interest at all.

It is, however, I must admit, a difficult matter to decide what is the real distinction between an entomologist and a "mere collector"; there are as many grades merging one into the other as is the case in many species of Lepidoptera and their varieties. An entomologist is almost as difficult to define as is a species. Anyhow, if a person desires to consider himself as belonging to

the superior fraternity, I do not see logically how he can possibly share the opinion of the Rev. W. Claxton, but must rather coincide with that expressed by the correspondent whom this gentleman condemns as implying that "no one was worthy of the name of entomologist who did not make his collecting entirely subservient to the elucidating of scientific problems."

During the greater part of my career as a collector of insects I must candidly confess that I have taken very little interest indeed in the great biological problems which are absorbing the attention of savants at the present day, such as A. R. Wallace, August Weismann, and many others. My collecting was formerly wholly undertaken in the old-fashioned style such as reigned supreme before Charles Darwin launched his well-known theories upon the world, and H. W. Bates had invented that wonderful theory of mimicry. It is only within the last two or three years that I have awakened to the advantage of a different course of action. Before I felt almost in the position of a barrister without a brief; now, however, I breathe more like a politician with a definite policy to pursue. It has, as it were, given me a new lease of life, and awakened pleasures hitherto wholly unappreciated and unknown.

Now there are many methods by which a collection of insects may be formed and arranged so as to be subservient to and assist in the elucidation of scientific problems. The method of course will vary according to the particular problem or series of problems for which the student possesses a special predilection. In the remaining portion of this essay I will endeavour to explain the method which I have adopted, and which has afforded me such an immense amount of pleasure. I must first of all own that no important results have as yet been obtained; it must be borne in mind that I am at present practically only a tyro in the particular line of research which I have after careful consideration finally decided upon, so that the paucity of material and data which I have obtained have precluded the possibility of my elucidating any biological problem of consequence. I do not, however, despair.

Well, then, the two subjects which I have decided to study, and to which I propose to direct my whole attention in the future, are Distribution and Variation, with especial reference to the Rhopalocera, European and Exotic. The reasons which have influenced me in this predilection need not be entered into here, neither why I prefer to patronise the butterflies. Suffice it to say that I find this group of insects more suitable for studying the various problems connected with the two branches of biological science indicated. Both of these subjects are so intimately connected with each other that they can be studied practically side by side, and the formation and arrangement of

the collection made with reference to the two at the same time. In order to provide a proper and uniform basis to work upon, I have prepared a series of maps, tables, rules, and formulæ for my guidance.

The maps consist of two series. In the first, which illustrates the zoo-geographical regions, the world is divided into six regions and twenty-four subregions, after A. R. Wallace. Each of these subregions I propose to study, and deal with in detail one by one. At present I am confining my attention to the two subregions in which the Continent of Europe is included. My idea is to work out the geographical distribution of each species of *Rhopalocera* in the area indicated. With this object in view I have prepared another map illustrating the provinces and sub-provinces, founded upon the principal river basins and other important physical considerations. A third map in this set serves in a similar way to illustrate the subprovinces in the British Isles. All these geographical divisions and subdivisions are differently coloured, and it is proposed later on to have the data labels similarly coloured in order to correspond with them; but of these more anon.

A second series of maps, consisting of three likewise, serves to illustrate the annual isotherms throughout the globe, in Europe and the British Isles, in addition to the zones of vegetation encountered between the equator and the poles. These are supplemented by tables giving the altitudes of the corresponding vertical zones of vegetation upon all the principal mountain ranges in Europe.

My aim is to obtain a series of every species possible from all these numerous geographical and climatological (= vertical) subdivisions, or as many of them as I am able. The principal points which I bear in mind are, firstly, to obtain as typical a collection of the *Rhopalocera* Fauna of each subdivision as possible; and secondly, to procure specimens illustrating the limits of variation of each species in them, special attention being directed to seasonal dimorphism.

This system has several drawbacks, the principal of which is the immense amount of room which each species occupies, especially in the case of those which possess a wide distribution, vary considerably in different parts of their range, and have several broods in the year. But the scientific advantages far outweigh any inconvenience occasioned by the vast amount of space required to carry it out. All the data labels which I employ correspond with the maps and tables above described, figures and letters being given instead of long particulars, the key to which is very simple. Every specimen is in addition labelled individually with a consecutive number which corresponds with a catalogue, wherein are entered full particulars of date, locality of capture, &c. The data labels illustrate the

history of series or groups of specimens. The following is an example :—

. 1. C. 8. e N. 5 a. Gen. 1

The key to the above is as follows :—

The first line refers to the Geographical Distribution. The Roman numeral indicates the Zoo-geographical Region (I.=Palæ-arctic Region). The first Arabic numeral indicates the Zoo-geographical Subregion (1=North European Subregion). The capital letter indicates the Province of the Subregion (C=West Central Europe). The second Arabic numeral indicates the Subprovince (8=France and Switzerland in the Basin of the Rhône, except the portion of the former country in the Basin of the Meuse, and a narrow strip along the Mediterranean littoral in the Basin of the Lower Rhône, which belongs to the Zoo-geographical Subregion 2 of A. R. Wallace). The small alphabetical letter indicates the District (e=Basin of the Upper Rhône).

The second line refers to the Climatal (or Vertical) Distribution and Generation. N. & S. mean North and South of the Equator (N.=North of the Equator). The first Arabic numeral indicates the Climatal Zone or its equivalent Vertical Zone (5=Cold Temperate Zone or Region of Deciduous Trees). The small alphabetical letter indicates the Sub-Climatal Zone (a=the Vine Zone). Gen. is an abbreviation for Generation, and the Arabic numeral following indicates the number of the generation in the season.

All the above numbers and letters, as I have already intimated, correspond with the maps and tables which I have prepared, and which furnish the key to the labels employed, and form the basis upon which the collection is being built.

The other subject which shares my attention is Variation. My object is to study and investigate the connection between Morphology and Climate (Latitude, Longitude, Altitude, &c.), and Local Conditions (Geology, Flora, &c.). Under the heading of climate special attention is directed to seasonal dimorphism and local variation, the latter coming also under the second category of local conditions.

To assist in more intelligently comprehending the relative value of the different degrees of variation to which Rhopalocera are subject, in order to arrange them in their proper position in the collection, I have found it necessary to formulate a series of rules for their classification; but they are practically only provisional ones at present. For my purpose therefore I classify the different forms of Rhopalocera as follows :—

1. Types.
 - a. Aberrations.
 - b. Hermaphrodites.
2. Seasonal Varieties of Type.
 - a. Aberrations.
 - b. Hermaphrodites.
3. Geographical Varieties of Type.
 - a. Aberrations.
 - b. Hermaphrodites.
4. Seasonal Varieties of Geographical Varieties.
 - a. Aberrations.
 - b. Hermaphrodites.

Then follow—5, Mimetic Varieties of Type; 6, Seasonal Varieties of Mimetic Varieties of Type; 7, Geographical Varieties of Mimetic Varieties of Type, with their respective Aberrations and Hermaphrodites; and, lastly, 8, Hybrids.

Each of the above is again subject to subdivision, such as Melanistic, Xanthochroic, &c.

The following are three specimens of the labels which I employ for the purpose of illustrating the degrees of variation:—

$1a$ Ab. <i>taras</i> .	$2a$ Ab. <i>nelo</i> .	3 Var. <i>alpina</i> .
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The numbers and letters correspond with the list given, and represent respectively *Syrichthus malvæ* ab. *taras* ($1a$), *Pieris rapæ* var. *metra* ab. *nelo* ($2a$), *Hesperia comma* var. *alpina* (mihi), (3). I may here remark that I do not repeat the name of the species in each sublabel.

In a great many cases varieties and aberrations in one district may be represented in another by a variety or aberration of different value. As an instance we have the form *lutescens* (mihi) of *Vanessa c-album* occurring on the Continent as a variety (a seasonal variety), but in this country only as an aberration of the first brood. In this relation I may remark that I follow the practice of Dr. Staudinger in discriminating between varieties and aberrations. In order to show the connection in this case between the aberration and the variety, of the form from this country, I prepare the label as below:—

$1a=2$ Ab. <i>lutescens</i> .

The sign $1a=2$ signifies that the form $1a$ is represented in another district by a form of superior value (2). The series of

specimens illustrating the aberration would follow the group illustrating the seasonal variety, the latter being the superior form, and therefore taking precedence. The following label would indicate the superior phase of variation:—

2
Var. <i>lutescens</i> .

A number of other combinations may be made with the signs in a similar way.

And now I come to the subject of Ocellation. I have prepared a special label for the purpose of illustrating this particular kind of variation in the Satyridæ, the following of which is a specimen:—

12345	12345
10000	10000

The four squares represent the four wings, and the Arabic numerals the submarginal spots upon each of them. The typical number of spots in each wing is represented by the same number of figures, and the number commences with the spot situated nearest the apical point. When any spot in the series is absent it is represented by 0, thus 12005, 10340, 10040. When very indistinct, only rudimentary, or when blind (*i.e.* when the typical form possesses a spotted centre), it is represented by x, thus 12xx5, 1x34x, 1xx4x. When two or more spots coalesce they are put in parentheses thus (12)345, 1(234)5. When the series is discontinued, or when there are two series of spots, a dot is placed between each of them, as 12.345.

The above formulæ I have found of great assistance in studying the ocellation of the Satyridæ, and am therefore in a position to recommend its use by students of this particular phase of variation. I hope I have succeeded in making the description of it sufficiently intelligible.

The data labels which I employ are of a uniform size of one by half an inch, the same as those illustrating variation, with the exception of those relating to ocellation, which are only about a third of an inch in width, the length (one inch) being the same however as the others.

The system of research which I here publish, and the method of arranging the collection in illustration of it, may possibly be improved upon; and if any of your readers have anything to suggest it will be very acceptable. In the meantime I will conclude by repeating that it affords me much pleasure, from an

intellectual point of view, which I did not dream of when I contented myself with being a "mere collector." Now that Darwin, Wallace & Co. have paved the way, the time has fully arrived when those who are interested in insects should do something more than amass large collections, which, without a proper method and system, are practically devoid of scientific interest or value whatever. The possessors of them are not one whit, in my mind, superior to ordinary postage-stamp collectors.

Birmingham, Aug. 30th, 1896.

UNIFORMITY IN PINNING AND SETTING LEPIDOPTERA.

BY WILMOT TUNSTALL, F.R.M.S., F.S.A.

THE subject of "Uniformity in Pinning and Setting Lepidoptera" has not hitherto received the amount of attention its importance deserves. I was therefore glad to see the subject occupying the front page of your September issue. The various articles which have appeared under these heads (*Entom.* xxix. 83, 125, 231, 269) cannot fail to be interesting and instructive to experienced and inexperienced lepidopterists alike, since they help one to make trials and comparisons, and adopt the little wrinkles of others, and so arrive at the most convenient, as well as the quickest, neatest, and best, methods of working.

No one who has made any attempts at exchanging can fail to have been impressed with the absolute truth of what has been said with reference to the great want of uniformity in pinning and setting. Quite as often as not, when an exchange has been made, it is found that the specimens received are so differently set from one's own made-up series that the symmetry of the whole would be entirely spoiled by the addition of the exchanged specimens. This is often both disappointing and annoying, and is not as it ought to be; for when British Lepidoptera or other entomological specimens are exchanged they ought all to be so set that they will look uniform in any strictly British collection. Here I should like to say most emphatically that this is quite possible of attainment. I am surprised none of your correspondents have gone to the bottom of the matter, and suggested a real and practical way out of the difficulty. Mr. Searancke's contrivance (*ante*, p. 231), though novel, is no remedy, for it would only be necessary for two persons to pin a given species on different blocks, and then exchange, to show that no uniformity had been arrived at. Mr. Leech (*ante*, p. 270) does in part suggest the remedy, but does not, I think, go far enough. It seems to me the matter should be taken in hand by our recognized leading and representative British Entomological Society

or Societies combined; and surely the subject is important enough for them to do so at once! In the first place this society or combination should adopt a range of standard sizes of pins, each size properly numbered. These should in future be known to the world as "The British Entomological Society's Standard Pins and Pin-numbers." Each size should be of a standard length, and be made from wire of a strictly defined wire-gauge. (Standard wire-gauges already exist.) This would compel pin manufacturers to come into line, and produce entomological pins for British use which would be the same from all makers, quality perhaps excepted. Next let the Entomological Society decide whether a specimen looks best stuck at the bottom of a pin resting on the paper, stuck at the top as if on a stilt, or midway, looking something like respectable, and hitting the happy medium. Uniformity would undoubtedly be best obtained by fixing the centre of the pin for the centre of the insect, as every eye can fix this point best, by reason of there having to be the same length of pin on the under as on the upper side; besides which you avoid extremes, and secure the important advantages which have been referred to respecting mites and air-circulation. Let the Society recognize the centre of the pin as its standard of height, and then go a step further, and adopt one or other of its own standard pins for every named species on the British list (giving two numbers where necessary by reason of the male and female varying greatly in size), have the number of pin to be used printed by the side of the name on the exchange lists, and the greater part of the difficulty would be solved. Every lepidopterist would thenceforward work to the exchange list, which would show him at a glance the standard number of pin he must use for each insect. Even if one had to pin hosts of captures one could not immediately identify, there would be no difficulty, as we should instinctively know by comparison which size of pin to use. I think five, or at most six, sizes of pins would meet all requirements for the Macro- and Micro-Lepidoptera put together. One should, in adopting or fixing the wire-gauge for the smaller sizes, err, if err at all, on the side of strength.

The mechanical and engineering world adopted years ago the Whitworth standards, which detail the number of threads per inch for different sizes of bolts, screws, nuts, &c.; also steam, gas, and water tubing. The adoption of these standards revolutionized those trades, bringing perfect order out of chaos and confusion. There are standards of thickness for copper, tin, zinc, and other sheets; also standards of thickness and weight for lead, glass, &c.

The Royal Microscopical Society has its own standard screw for objectives and other fittings, to which all English makers conform, and by means of which all English-made objectives are

interchangeable; and why should not the British Entomological Societies have their own standard pins, and standard or recognized styles of setting? It is only necessary for these standards to be fixed, to be stamped with the authority of our leading Entomological Societies, and then be given out to the world through the journals and an authorized exchange list, to make them a matter of common knowledge and common adoption.

If we have no single Entomological Society with a "standing" or "status" equivalent to that of the Royal Microscopical Society, and powerful enough to make its authority known and respected, then either let one be formed, or let a joint committee of our expert entomologists be appointed by the leading Entomological Societies to work the matter out; but by all means appoint gentlemen who can and will meet together often for the purpose till the difficulty has been satisfactorily overcome. This committee should also definitely decide whether oval or flat setting is or shall be the recognized British style, and further settle the angle at which the wings are to be set. If four or five representative species of Lepidoptera were figured at the top of the authorized exchange list, showing the direction of the lines of the wing margins should take or be aimed at, also a figure or two, making plain to all the very explicit instructions which have been given respecting the insertion of the pin through the thorax, these points taken collectively would embrace all the details of pinning and setting necessary to produce something very nearly approaching perfect uniformity. Adopt standards, and you may depend upon it none but standard pins would be asked for, purchased, or made. The text-books would soon give definite instructions. You would soon find a very marked improvement in setting all round, and ten times more satisfaction in exchanging than can at present possibly be. All collections commenced after the general adoption of fixed standards would be uniform throughout. Beginners (remember these may be persons of vast and ripe experience, but not entomological) would be able to retain much more of their earlier work in after years, by reason of having commenced to work on systematic and proper lines. Some species might even receive some amount of protection through its not becoming necessary to throw away so many samples of early work, which were badly set through lack of proper knowledge at the outset.

The points I have named could easily be dealt with, and in a short time, by—1st, comparing the numbers and sizes of different makers' pins, and then selecting the most suitable sizes and numbers as the standards; 2nd, by comparing insects set at different heights and placed side by side; 3rd, by going through a typical collection and jotting down on an exchange list the standard number of pin to be used for each species. The publication of an authorized exchange list, giving details and

examples, would do all the rest. I would treat all orders of insects in this way, so that there would be uniformity in all orders. Until some hard and fast lines such as I have attempted to describe are laid down, uniformity in pinning and setting cannot and never will be attained. All who are interested in this subject ought to bring the matter prominently before the various Societies with which they are connected, and agitate for a new departure and definite instructions on the subject till we get them.

Brook House, Meltham, near Huddersfield, Sept. 3rd, 1896.

THE ANDROCONIA OF *CALLIDRYAS FLORELLA*.

By J. C. RICKARD.

THE genus *Callidryas* is allied to *Gonepteryx*; *C. florella*, although its wings are unangulated and is a larger species, is much like *G. rhamni* in general appearance. The wings of the male are greenish white, with small dark stigmata on the primaries; there are faint almost invisible rust-coloured spots at the ends of the nervures; it is, therefore, nearly unicolorous. The under side is somewhat darker, with many minute wave-like transverse markings; there is a small reddish stigma on the under side of each wing. Near the base of the inner margin of the primary of the male is a brush 12 mm. long, composed of radiating silky hairs 5 mm. in length; the hairs originate on the under side of the wing, but a part of that portion of the wing that produces them is folded over so as to bring the greater portion of the brush to the superior surface, where it forms a series of plumes, part of which overlie the anterior and part the secondary wings; the other portion of the brush is pressed down close to the under side of the wing; the cause of part of the wing being turned over is purely mechanical, and results from the hairs being so thickly crowded together that there is not sufficient space for them without slightly distending that part of the membrane on which they grow. As there is nothing to cause a similar expansion of the upper side, it follows that the lower membrane becomes a little wider than the upper, consequently the edge of that part of the wing "buckles" or turns upwards; the rest of the inner margin, beyond the brush, resumes its normal position, only the part bearing the brush being turned up. On the upper surface of the secondary wing, between the costal and subcostal nervures, is a lozenge-shaped patch of modified scales about 8 mm. long and 2 mm. broad, composed of scales so thickly crowded together that they are forced to remain in the nearly perpendicular position they occupied on the unexpanded wing; the patch is immediately below the brush of the

fore wing. Part of the base of each wing is more thinly clothed with scales than the remaining portion, the two parts being abruptly divided, so as to be plainly seen with a pocket-lens. One is almost inclined to believe that some of the scales forming the general covering have been requisitioned to form the androconial patch, but as there is no "patch" on the upper wing such an explanation would scarcely be adequate. The scales of the patch seen by transmitted light are dark coloured, and like most highly specialized scales are rounded, or without pectinations at their apices; the striæ are very fine, owing to this and the opacity of the scales they are not readily seen; by reflected light they appear white and highly polished; the scale-walls are seen to be thrown into longitudinal folds, as if partially emptied of their contents; the hairs of the brush have rounded apices, and seem nearly black by transmitted light.

The structures described above form a good example of what are known as "Androconia," and are supposed to be the agents employed in the production and diffusion of odours; but a little consideration will show how closely they resemble stridulating organs; it is probable that they may serve both purposes, the friction between the brush and patch promoting the diffusion of scented vapours or particles, at the same time producing sound, which although inaudible to our ears may nevertheless have a real existence. I do not wish to deny the association of these structures with scent-producing powers, but the alleged existence of the odours seems to rest mainly on hypothetical considerations; on the other hand, the movements of the brush over the up-turned ends of the scales forming the patch must produce vibration, therefore sound must necessarily be evolved.

May not a word be said in favour of the visual organs of the butterfly in question. If its senses of smell and hearing are gratified, or if they in some measure conduce to its well-being, why may not its power of sight also perform its part? The aigrette-like plumes of the brush form what to us are very graceful objects. Are the owners of them denied a similar gratification? They may be unable to have a satisfactory view of their own individual adornment, but surely they can see those of their fellows; and the sight of these ornamental plumes is probably appreciated by the female portion of the *florella* population. Androconia, such as I have endeavoured to describe, are, I believe, generally regarded as guides to enable one sex to more readily discover the near proximity of the other sex. This seems a false view of their function; but if we regard the odoriferous emanation as productive of sexual excitability, we can understand that a similar result may be achieved by means of the senses of sight and hearing; all three senses, in this species, performing their parts in promoting its well-being.

NEW BEES OF THE GENUS *MELISSODES*.

BY T. D. A. COCKERELL.

(1.) *MELISSODES SPHERALCEÆ*, n. sp.

♂. Length about $9\frac{1}{2}$ mm., antennæ 5 mm. Black, rather densely covered with erect mouse-grey hair, which becomes white on the face, lower part of cheeks, lower part of pleura, margins of abdominal segments, and legs. Head broad, clypeus wholly black, mandibles with a large yellow spot without near base, face quite densely hairy. Vertex shining but punctured, flagellum entirely fulvous beneath, its first joint distinctly shorter than the fourth or third. Mesothorax shining, with large and deep rather close punctures; metathorax closely punctured, except its basal middle, which is very sparsely punctured. Tegulæ shining brown, hairy. Wings hyaline, nervures and stigma fuscous, third submarginal cell longer than first, narrowed rather more than half to marginal. Legs black, tarsal joints after the first rufous. First tarsal joint of all the legs with orange-rufous hairs on inner side. First segment of abdomen with erect very pale grey hairs, the first five segments with rather broad apical bands of appressed dull white hairs, the dark areas before these bands with fuscous hairs, even on the first segment. On the sixth segment the band itself becomes pale fuscous. Fifth and sixth segments with a tooth on each side; apex narrowly truncate, broad at base, strongly notched on each side before the end.

Hab. Santa Fé, New Mexico; three specimens, July 25th, 1895, in Mr. Boyle's garden, at flowers of *Sphæralcea angustifolia*.

There is another species with a black clypeus in the male found in New Mexico, *M. tristis*, Ckll., which I have taken in the Mesilla Valley and at San Marcial. It is easily known from *sphæralceæ* thus:—

Larger, antennæ longer than head and thorax, mandibles with no yellow spot, pubescence of sixth abdominal segment whitish; species of the Upper Sonoran zone *tristis*.

Smaller, antennæ only reaching to metathorax, mandibles with a light yellow spot, pubescence of sixth abdominal segment brown; species of the transition zone *sphæralceæ*.

M. intorta, Cr., from Texas, has the clypeus black in the male, but the abdomen is not banded, and the antennæ are shorter than in *sphæralceæ*.

(2.) *MELISSODES TOWNSENDI*, n. sp.

♂. Length about 15 mm., stoutly built, black, covered all over with short yellowish-fulvous pubescence, which becomes white on the face and lower parts of cheeks and pleura. Head broader than long, inner orbital margins nearly parallel, face not very much broader than the width of an eye, vertex relatively narrow, very little broader than face; pubescence of face and occiput dense but rather short; clypeus,

labrum, and base of mandibles very pale yellow; scape hairy, flagellum rufous beneath, first joint of flagellum much shorter than third, and less than half as long as second. Thorax densely covered with fulvous pubescence, so that the surface cannot be seen; on the pleura beneath the pubescence is white, while on the scutellum it is very dark fuscous. Tegulæ reddish testaceous, pubescent. Wings smoky-hyaline, nervures fuscous, second recurrent nervure joining third submarginal a little before its end, first submarginal cell about as long as second, third longer, narrowed somewhat more than half to marginal. Legs densely covered with pale fulvous pubescence, conspicuously plumose on hind tarsi, spurs pale rufous, terminal joints of tarsi and bases of claws rufous. Abdomen stout, densely covered with fulvous pubescence, erect on basal two-thirds of first segment, otherwise appressed. Hind margins of segments more or less whitish. Apex rounded-subtruncate, apical hairs concolorous with the rest.

Hab. Las Cruces, New Mexico, Aug. 5th (C. H. T. Townsend). One specimen only, with the antennæ unfortunately broken. The species must be rare, as I have never met with it. It has been compared by Mr. Fox with the types at Philadelphia, and he assures me there is nothing like it.

This belongs with the series of *M. obliqua*, in which the males are large and stoutly built, and the vertex is narrow in comparison with that of the smaller species. It differs at once from *obliqua* (which occurs on *Cleome serrulata* at Santa Fé, N. M.) in having the abdomen pubescent all over, instead of banded. It is, however, quite closely allied to it.

(3.) *MELISSODES RUIDOSENSIS*, n. sp.

♂. Length $12\frac{1}{2}$ mm., anterior wing 8 mm., antennæ 9 mm. Black, with moderately dense erect pale ochreous-grey pubescence, becoming whitish on lower parts of face, cheeks, and pleura. Head broad, area behind ocelli closely punctured, that on each side of them practically impunctate. Clypeus primrose-yellow, a spot on each side and the anterior margin black, labrum black, mandibles without any yellow spot. Antennæ wholly black, long, extending about as far as hind margin of second abdominal segment; flagellar joints longitudinally keeled, strongly granular, first joint of flagellum very short, considerably less than a quarter the length of the long second joint. Thorax quite densely hairy, some black hairs intermixed on scutellum and hindmost portion of mesothorax, mesothorax shining, with tolerably close large punctures. Tegulæ piceous, wings smoky-hyaline, thinly but noticeably pubescent, nervures piceous, third submarginal cell narrowed considerably more than half to marginal. Inner sides of first joints of tarsi with orange-rufous hairs, spurs pale ochreous. First segment of abdomen covered with long erect pale ochreous hairs; segments 2 to 5 with rather broad conspicuous subapical bands of appressed pale ochreous hairs, that on the second segment narrowed in the middle; before each of these bands the segment is thinly clothed with black hairs; the second segment has pale hairs about its base. Sixth segment with fuscous hairs, those of the extreme margin

pallid. Margins of all the segments whitish-hyaline. Apex dark rufous, truncate, with a small square notch on each side. Subapical lateral spines small.

Hab. Ruidoso Creek, New Mexico; two asleep in a corolla of *Pentstemon*, 7400 ft., July 6th; one on *Eustoma* ? sp., 7500 ft., July 6th; three on *Pentstemon*, 6400 ft., July 8th. All collected by Prof. E. O. Wooton. I sent an example to Mr. Fox, with the remark that I supposed it to be new, but it might possibly be *M. confusa*, Cr. He writes that it "differs from *confusa* in the black hair of centre of dorsulum, and at base of dorsal segments; moreover, it has but five white bands, unless one be worn off (on last segment), whereas *confusa* has six."

(4.) *MELISSODES PALLIDICINCTA*, n. sp.

♀. Length about 13 mm., antennæ about $3\frac{1}{2}$ mm. Black with pale ochreous pubescence, whitish on lower parts of face, cheeks, and pleura. Head extremely broad, face broader than long, vertex shining, very sparsely punctured, face thickly pubescent, antennæ dark, the flagellum only obscurely rufescent beneath. First joint of flagellum as long as second and third together, second a little shorter than third. Thorax with dense but rather short pubescence, scutellum with short black hairs. Mesothorax shining but strongly punctured. Tegulæ piceous, hairy, with a nude shining spot. Wings greyish-hyaline, nervures piceous, third submarginal cell narrower at top than second. Legs quite hairy, the hairs pale, almost silvery, scopa of hind legs rather thin, conspicuously plumose. Claw-joints becoming rufescent. First segment of abdomen with erect pale grey hairs; segments 2 to 4 with broad subapical bands of appressed white pubescence, very conspicuous, more or less notched medially behind. Bases of segments 2 to 4 intensely black, with short black hairs, extreme base of 2 covered with pale hairs. Fifth segment and apex clothed with dark fuscous hairs. Pygidium transversely striatulate. The nude apex of the first segment appears narrowly white or creamy, that of the others black, the apical margins are really transparent, and take the colour of the hair beneath them. Hairs on inner side of first joint of hind tarsi black.

Hab. West Fork of Gila River, New Mexico, July 12th and 16th, ten specimens (C. H. T. Townsend); Santa Fé, N. M., on alfalfa, June (Ckll., 1123); Watrous, N. M., July 13th, 6200 ft. (Ckll., 2495). I sent an example to Mr. Fox, stating that it appeared to be new. After comparing it with the types in Philadelphia, he states that the species is apparently good. It has some superficial resemblance to *Synhalonia belfragei*, Cr., but that is structurally quite different. It is perhaps as near to *M. montana*, Cr., as to anything, but that has the abdominal bands golden ochraceous.

(5.) *MELISSODES GILENSIS*, n. sp.

♀. Length 13 mm., antennæ about 4 mm. Rather stout, black, with silky-grey pubescence (and some black) on head and thorax, and

pale ochreous pubescence on abdomen. Head rather broad, face from vertex to margin of clypeus almost exactly square, clypeus bare, closely, rather coarsely, and more or less confluent punctured; face with rather thin grey pubescence, occiput with black hairs in front and pale hairs behind, lower margin of labrum with a tuft of orange hairs; flagellum slightly rufescent beneath, its first joint about as long as the second and third together. Thorax rather densely covered with grey pubescence, slightly tinged with ochreous on dorsum, posterior half of mesothorax, and scutellum, with black hairs. Mesothorax shining, the punctures not very close, the surface can be distinctly seen near its hind border, and the anterior part of the scutellum is also relatively bare. Tegulae piceous, the anterior half hairy. Wings smoky, nervures fuscous, third submarginal cell narrowed more than half to marginal. Pubescence of legs whitish, scopa of hind legs dirty white, fairly dense, distinctly plumose, anterior tibiae with a brush of orange-red hairs on inner side, first joint of anterior tarsi with dark fuscous hairs on outer side, and dark orange-rufous hairs on inner, first joint of middle and hind tarsi with pale hairs on outer side, and reddish-orange hairs on inner side. Claw-joints rufous. First segment of abdomen with rather thin yellowish-grey hairs; its hind margin narrowly pallid. Second segment with two bands of appressed pale ochreous hairs, one median, the other basal. Third segment covered with similar pubescence except hind margin, fourth segment wholly covered, fifth segment and apex with black pubescence—a sort of purplish-black, the colour of the spores of certain agarics. Venter bare, except the margins of the segments, which are fringed with dark brown hairs. There is a conspicuous patch of brown-black hairs on knees of hind legs, and the middle tibiae without have the pubescence largely of the same colour.

A male specimen, unfortunately without its antennae, taken on the same day and at the same place as some of the females, almost certainly belongs here. It is somewhat smaller than the female, the wings are not so dark, the pubescence of thorax above is more inclined to be yellowish, the black hairs of the thorax are almost entirely confined to the scutellum, the pubescence of face is copious, and covers the clypeus, which is pale primrose-yellow, with a black margin. Labrum and mandibles wholly black. Second abdominal segment with only one hair band, that subapical; hair bands with fuscous or black hairs just in front of them, not conspicuous unless the insect is seen from the side; pubescence of apex pale. Inner side of first joint of hind tarsi with bright orange-rufous hairs. This is easily known from *ruidosensis* by the light pubescence of the apex of the abdomen.

Hab. West Fork of Gila River, New Mexico, July 12th, 16th, and 17th; six females, one male (C. H. T. Townsend); La Tenaja, near Santa Fé, N. M., a form with a somewhat broader face, but evidently the same species; two females (Miss Myrtle Boyle).

Mr. Fox has kindly compared this with the types in Philadelphia, and remarks that it comes near *montana*, Cresson. A male from the West Fork of the Gila, July 16th (Townsend), is identified by Mr. Fox as *montana*; it differs from the male of *gilensis* in having the abdomen more uniformly hairy, and the pubescence of the apex black. The labrum also is yellow, and the mandibles have a yellow spot without.

A female *Melissodes*, which is common at Santa Fé, Mr. Fox says is apparently identical with *confusa*, although what I regarded as its male is not the same as the male assigned to *confusa* by Cresson. This bee, which is more especially found on flowers of *Grindelia squarrosa*, but also on *Lepachys tagetes*, about the beginning of August, is very much like *M. gilensis*, but is known from it at once by the hairs on inner side of first joint of hind tarsi of the female being black, whereas in *gilensis* they are reddish orange.

Mesilla, New Mexico, U.S.A., July 5th, 1896.

ON TWO NEW *CHARAXES* FROM THE LESSER SUNDA ISLANDS.

BY THE HON. WALTER ROTHSCHILD, F.Z.S., F.E.S., &c.

1. *CHARAXES SUMBANUS*, sp. nov.

THIS magnificent species belongs to the *polyxena* group, but it is unlike any other *Charaxes*, and has the shape of the African *C. caudiope*. The fore wing has deeply concave outer margin, and strongly arched costa.

♀. Fore wings: basal third dark russet-brown, with reddish tinge, rest sooty black; from the centre of costa almost to vein 1*b* runs a broad oblique white band, 7 mm. wide at costa and 4 near vein 1*b*; this band is split up by the veins into six spots, of which the last is double, and the spot between veins 2 and 3 is conspicuously larger than the one before it; the band includes two black dots behind costa; half-way between the band and apex just under the costa is a small dirty buff spot. Hind wings: rufous chocolate; near the margin is a broad black band composed of seven oval spots, the two first 9 mm. wide, and the following gradually diminishing to the anal angle; within the spots is a white dot, which in the three first stands nearer the outer edge; the first four black spots coalesce, while the three last are separate; on each side of the black band is a brownish yellow line, that on the inner side consisting of crescent-shaped spots, which are bordered inside with dark brown; outer margin reddish chestnut, darker at anterior half; tip of tails yellow; length of tails 9 mm. and 7 mm. respectively; inside the brown border of the crescent-shaped marks are three brownish white spots, first palest and largest, forming a short curved band. Under side: fore wings isabelle drab; white

discal band as above; the two black dots replaced by two tawny ones, and a minute third one before them; the white band is bordered on inner side by a strongly marked tawny line stopping at vein 5; between this and base are five tawny lines—one on the disco-cellular veinlets, the next very irregular between costa and vein 1*b*, the three others within the cell; beyond the white band is a transverse line of dark brown lunules; the area beyond this line is paler, so as to form oval whitish drab patches, each with a spot in the centre, the first five spots brown and the last two black; spots 1, 6, and 7 largest. Hind wings: ground colour the same as fore wings; a central transverse white band between costa and abdominal margin, its inner margin irregular, deeply sinuated, bordered by a tawny line interrupted at veins; between it and base are three broken irregular lines of tawny colour, besides a short one on disco-cellular veinlet; outside the white band is a transverse line of whitish buff lunules,

bordered inwardly with brown and outwardly heavily with chestnut; there is a submarginal row of seven blue spots joined to white and black dots, between them and outer margin is a dirty buff line; tails and margin buffy drab. Body rufous above. Length of fore wing, 43 mm.

Hab. Sumba or Sandlewood Island (W. Doherty; February, March, 1896).

2. CHARAXES SUMBANUS SAMBAVANUS, subsp. nov.

♀. Differs from *sumbanus* mostly on under wings; the white central band on upper side consists of five instead of three spots; the first is 1 mm. shorter, and band much straighter; the anterior submarginal yellow spot is wanting, and the inner yellow line of lunules much broader and paler; tips of tails almost white; on fore wing there is a costal white streak in front of the white band. Under side: markings all more strongly accentuated; the space between white band and line of lunules dark brown instead of drab; outer margin of fore wing less concave, and costa less curved.

Hab. Bima, Sambawa (W. Doherty; February, 1896).

THE LATE MISS GEORGIANA E. ORMEROD, F.E.S.

MISS GEORGIANA E. ORMEROD was the daughter of the late George Ormerod, D.C.L., F.R.S., of Sedbury Park, Gloucestershire; and Tyldesley, Lancashire. She was born July 23rd, 1823, in London; and died at St. Albans on August 19th last, aged seventy-three years.



Educated under the superintendence of her mother, a most talented woman, the deceased shared with her three younger brothers in their scientific pursuits.

Botany and conchology were the subjects in natural history to which she devoted especial attention, and in the latter she was well versed, including careful observations of the habits of such of the British species as came under her notice. On removing to St. Albans, in 1887, she presented her collection, then numbering approximately 3000 distinct species, to the Beaumont Park Museum, Huddersfield.

In later years her attention was more given to entomology, as a subject which could be more practically employed; and in 1880 she was elected a member of the Entomological Society of London. After this much of her leisure time was given to entomological drawing, showing the insects in their different stages, carefully drawn and coloured (so far as possible) from life. Some of these drawings were of life-size, or not too large for convenient use in cases at various of our Agricultural Colleges. But her chief work, which she continued until within a very few weeks of her decease, was the execution of large coloured drawings, also showing the insects in their various stages, of which she presented large numbers for entomological service to scientific friends, or for use in various of our Agricultural Colleges in this country and in some of our colonies.

Some of her work was recently shown during the past summer in connection with the collection of insects injurious to agriculture exhibited by her sister, Miss Eleanor Ormerod, at the Bath and West of England Society's Show at St. Albans, which collection has since been presented by the sisters to the University of Edinburgh, by whom it has been placed in the Edinburgh Art and Science Museum, under the name of "The Ormerod Collection."

Miss Ormerod was a great reader, and especially fond of following up any historical point which took her fancy; and was also a good linguist. She was a woman of strong religious principle; and will be much missed, not only by her friends, but by her poorer neighbours.

E. A. O.

NOTES AND OBSERVATIONS.

ACHERONTIA ATROPOS.—Upon seeing Dr. Sharp's notes on this larva (*ante*, p. 284), I was in hopes that I might have gathered some information respecting the care of these larvæ in captivity. But his interesting remarks were, I found, confined to the particular conditions only of those which had come into his own possession this year. I shall be glad if some entomologist will kindly give me some information as to the treatment of this insect in captivity. At various times I have had the larvæ and pupæ brought to me from the potato grounds in our fens here, but I have never been successful in developing the perfect insect. Sometimes the larva has died, at other times the pupa, which latter, when unearthed, has been found covered with a pink mould. Is it desirable to unearth the pupa, as it is not possible to retain the earth shut up in a cage in a natural condition? And if so, is it an advantage to resort to artificial heat and moisture to aid the change into the perfect insect in October?—EDWARD R. WALKER; Billinghay Vicarage, Lincoln, Sept. 10th, 1896.

From the communications from various localities in your last number, and from the many larvæ and pupæ I have heard of and seen

here, this is an "*atropos* year." As the rearing of the moth from the pupa is very uncertain, I beg to refer your younger subscribers to a paper in which I described a plan for "forcing," which I have since found successful, and which I intend to follow with those pupæ I have obtained this year. The paper referred to appeared in the 'Entomologist' for May, 1886, vol. xix. p. 125.—(Dr.) H. W. LIVETT; Wells, Somerset, Sept. 7th, 1896.

NOTE ON *CHESIAS RUFATA* (OBLIQUARIA).—I have bred a number of this insect each year for some years past, and have been much surprised at its very eccentric range of emergence. Newman says it "continues on the wing from the middle of May to the middle of July"; its period is, however, sometimes much more protracted than this, as the following dates, for the last three years, will show:—

1894.	First one bred on March 24th,	the last on Sept. 28th.
1895.	" " May 31st,	" " June 28th.
1896.	" " April 12th,	" " Aug. 20th.

Of course all were kept under precisely the same conditions. The pupa also not infrequently lays over a second winter in that state; the insect bred on Aug. 20th of the present year was one of a number which pupated in October, 1894.—E. H. TAYLOR; 52, Mimosa Street, Fulham, Sept. 15th, 1896.

VANESSA C-ALBUM.—In the last number of the 'Entomologist,' p. 274, are some remarks from the pen of Mr. Harcourt-Bath upon the above butterfly. As an entomologist who has studied this species for over sixty years, I venture to differ from some of his conclusions. I believe I was the first British entomologist to draw attention to the light-coloured early brood, produced by hybernated parents; Mr. Doubleday assured me I was so. He doubted there being two broods until I convinced him such was the case, and then he begged permission to name the pale early variety "*hutchinsonii*," and thus it was known for some years. Now Mr. Harcourt-Bath renames it "*lutescens*." Is this right? I have during many years reared this species, and never till this year have I found the ova from hybernated parents produce many of the dark form in captivity; their doing so this spring, I feel sure, proceeded from my feeding on currant and hop leaves. About one-fourth of those fed on currant were of the dark autumn form, and every one on hop were so. In former years, when fed on the common stinging-nettle, *Urtica dioica*, there scarcely ever was a dark form. I find the perfect insects bred this year are of smaller size than usual, from the very quick manner in which the larvæ fed up. The finest specimens I have ever bred have been when very early warm springs have tempted the butterflies out, and ova being obtained and hatched, the larvæ have been subjected to a return of cold unseasonable weather, and have fed up slowly. If cold came before the ova hatched they perished, if not placed in a warm room.—E. S. HUTCHINSON; Grantsfield.

TRIPHÆNA SUBSEQUA AND ORBONA.—My thanks are due to Mr. Robert Adkin for the valuable suggestions he has thrown out with regard to the above mentioned species as to their being distinct or one. To men-

tion the name of the entomologist from whom I obtained the queried information is simple, and I hasten to disclose it—Mr. Tate, who, as most entomologists will doubtless know, is, and has been for many years, a resident of Lyndhurst. Now, I do not for one instant propose to uphold the truth of his statement; but nevertheless a statement made as a fact pure and simple by one of such large and extended practical experience ought not to be lightly set on one side. I expressed a wonderful surprise at the time, and perchance a rather unbelieving surprise, as my informant at once became most insistent with regard to the circumstances, which certainly appeared to prove it. Of course some mistake might possibly have occurred in some of the transformation scenes in this particular hatch, and the two species might have become intermixed, although apparently derived from the same source; yet even so, I can hardly credit such an occurrence without his knowledge after seeing the exceedingly great care which he bestows upon them. It must also be remembered that Mr. Tate, who gets his living by means of natural history, and who would be rather injured than otherwise if *subseque* were proved to be identical with *orbana*, seeing that it is a higher-priced insect, must have some evidence, strong enough at any rate to convince himself, to impel him to make such a surprising statement. Altogether, I cannot help thinking that a sufficiently clear case is made out to warrant further careful investigation of this interesting subject, which I sincerely hope will be done by some who have greater opportunities for breeding the insect in question, and greater qualifications for drawing the proper conclusions, than are vouchsafed to me. — C. J. NASH; Pitnacree, Culver Road, Reading, Sept. 2nd, 1896.

COLLECTOR *v.* ENTOMOLOGIST.—All collectors ought to thank the Rev. W. Claxton for his remarks (*ante*, p. 286) on the above subject. As a collector myself I cordially do so. I would also beg him to take heart, and never feel “shamefacedness” at the title, but when he reads offensive remarks on the collector to note from whose pen they proceed, I venture to say not from that of a real entomologist. Truly scientific men I have ever found courteous and ready to give information to others less learned than themselves. I doubt if the would-be scientific ever feel the real admiration for the beautiful objects they are experimenting upon that the humble collector does.—E. S. HUTCHINSON.

HIGH FLAT-SET INSECTS.—I was very pleased to read the article by Mr. Leech (*ante*, p. 269) in favour of the continental method of setting insects. For a number of years past I have adopted this style, having been awakened to its advantages by viewing a collection of Lepidoptera brought to this country by a German entomological acquaintance. So infatuated did I become with the high-flat system that I there and then decided to scatter my former collection to the winds and commence afresh, and I have never had any cause to regret the decision which I adopted. Now that there are such facilities for travelling on the Continent, and also on account of the annually increasing number of entomologists who are taking an interest in foreign insects, I will venture to predict that the high flat-set style will become popular before long. In my idea the English style of setting is an appropriate

emblem of our insular prejudices, and a practical exposition of the law of amixia.—W. HARCOURT-BATH.

FUNGI OR ANDROCONIA?—In the August number of the 'Entomologist,' the article by Mr. J. C. Rickard, after acknowledging criticisms by Dr. Sharp and Mr. Scudder, says, "Neither of these gentlemen seems to have personally investigated the subject, both having referred me to the works of other entomologists." In Mr. Scudder's case, at least, this was simply an evidence of that gentleman's modesty, because certainly no one in the United States has made a more thorough study of just these characters. In his magnificent work, 'The Butterflies of the Eastern United States and Canada,' plates 43 to 51 inclusive are entirely devoted to pictures of androconia and of parts of the wing containing them, showing just how they are attached, in what part of the wing, and also what sort of markings may be found on them. I would like to refer Mr. Rickard particularly to plate 47, figs. 1 and 2, where he would see what is probably as nearly like a spore formation in some kinds of fungus as can well be imagined. Mr. Scudder has examined nearly all our American species, and, though my testimony is not needed in the matter, I have found his pictures in every case absolutely correct, and I cover more or less of the ground each year with my students. If Mr. Rickard will carry his investigations on butterfly scales just a little further, he will find that, except for their greater delicacy of structure, these androconia do not differ from the other wing-scales.—JOHN B. SMITH; Rutgers College, N.J., Aug. 8th, 1896.

CAPTURES AND FIELD REPORTS.

VARIETY OF *NEMEOBIUS LUCINA*.—I captured a very striking aberration of *Nemeobius lucina* (male) near Taunton on May 18th of this year. The ground-colour of the left fore wing is a light smoky brown, darkening as it approaches the base, where it is normal. The nervules are of the same colour. The brown markings, which are so conspicuous in the normal specimens, are entirely absent, being replaced by a smoky white; the triangular markings on the outer margin are of a shade rather darker than that of the ground colour. The fringe is pure white and not serrated, thus leaving the line around the outer margin very regular. The under side has, like the upper side, lost all its beautiful brown markings, these being replaced by a dull smoky colour.—JOHN BUCKLAND; 4, East Street, Taunton, Sept. 15th, 1896.

VARIETY OF *LYCÆNA ICARUS* (ALEXIS).—At Swanage, on August 11th, I captured a variety of *L. alexis*, with the black spots near the margin of under side of fore wings enlarged into five black lines and with one black line on each side of the hind wings. The aberration of the markings of fore wings is somewhat similar to that shown in the lower of the two varieties of this species figured in Newman's 'British Butterflies.'—E. V. HALL; 4, The Avenue, Brondesbury, Sept. 14th, 1896.

VARIETIES OF *CHRYSOPHANUS PHLÆAS*.—I caught here, Aug. 10th, two varieties of *C. phlæas*. In one specimen the left fore wing is of a pale straw-colour, inclining to copper at the base, the other wings being normal. In the

other variety the usual copper colouring is replaced by a dingy white, nearly approaching var. *schmidtii*.—F. L. BLATHWAYT; Bromyard, Worcester.

GYNANDROUS AND OTHER VARIETIES OF *CHRYSOPHANUS PHLÆAS*.—We have taken an hermaphrodite *C. phlæas*; left wings male and right female; the antennæ, however, are just the opposite, the longer one being on the male side; the wings are very distinctive. We also met with the shining straw-coloured form, a female, but unfortunately the hind wings have been partly bitten off by some bird or reptile; otherwise it is fine, the fore wings being very glistening. Another specimen we captured has the normal colour, but the band on hind wings is only represented by slight streaks.—E. SABINE; The Villas, Erith, Sept. 10th, 1896.

VARIETY OF *CATOCALA NUPTA*.—On the 17th inst. I captured a specimen *C. nupta*, the under wings of which are devoid of the slightest shade of red or orange, and may be described as dusky black-brown. It is a handsome specimen, and the type very distinctive. Probably it may be a well-known one, but although I have had acquaintance with *C. nupta* for about a quarter of a century and taken varieties, I have never met with anything like it before.—SIDNEY COOPER; Hawkwood, Chingford, Aug. 27th, 1896.

[A somewhat similar aberration of this species is recorded, Entom. xxv. 243.—ED.]

DEILEPHILA LIVORNICA IN HANTS.—A specimen of *D. livornica* was caught last month here. It was brought to me by a boy who found it resting on some furze-bushes, a quantity of bedstraw growing near. Unfortunately the specimen is much rubbed on thorax, otherwise perfect.—(Rev.) A. D. PATTERSON; Belsito, Milford-on-Sea, Lymington, Sept. 12th.

EMERGENCE OF *SMERINTHUS POPULI* IN AUGUST.—On June 28th my friend D. Forbes-Winslow gave me a caterpillar of *S. populi*; the following day it went to earth, and became a pupa on the 30th; and on Aug. 15th a female moth of the dark form emerged. Is not this a record time? The moth was only fourteen days in pupa.—H. W. BELL-MARLEY; Ravenscourt Park.

EARLY AND LATE EMERGENCES.—This has truly been an abnormal season, and the dates concerning the time of appearance of the following species are interesting:—*Hepialus humuli*, flying freely, last week in May; *Abraxas grossulariata*, well out last week in June; *Smerinthus populi*, a pair in cop. first week in July, and again a pair in cop. Aug. 7th (probably a second brood); *Acronycta megacephala*, a fresh example on July 28th; and *A. psi*, a specimen in good order, Aug. 16th. Are the two last species sometimes double-brooded?—A. T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W., Aug. 20th, 1896.

AUTUMN EMERGENCE OF *PHORODESMA PUSTULATA* (BAJULARIA) AND *PSEUDOTERPNA PRUINATA* (CYTISARIA).—Both these species normally hibernant as larvæ while quite small; I think, therefore, that it may be of interest to record that out of a brood of *Phorodesma bajularia*, hatched in July, 1895, and sleeved in my garden, one larva fed up rapidly, pupated the middle of September, and the imago emerged on Sept. 24th. The others showed no tendency to feed up the same year, and hibernated quite small, as usual. This year one larva in a small brood of *Pseudoterpna pruinata* has behaved in the same way, pupating on Aug. 18th, and the imago

emerging on Sept. 6th. The other members of the brood remain quite normal in size.—E. H. TAYLOR; 52, Mimosa Street, Fulham, Sept. 15th.

[The emergence of *P. smaragdaria* in September is recorded, Entom. xxviii. 307.—ED.]

SPHINX CONVULVULI AT READING.—Yesterday, the 16th inst., I had a fine female of the above species brought me; it was taken in a garden near my house.—W. E. BUTLER; Hayling House, Reading, Sept. 17th, 1896.

OBBEREA OCLATA IN CAMBRIDGESHIRE.—The capture of *Oberea oculata* is, I think, worth recording. I have the satisfaction of saying that a fine specimen of this scarce Longicorn was kindly sent me a few weeks ago by Mr. E. H. Thornhill, of Boxworth, Hunts. It was brought to him by a working man who picked it up in Wicken Fen.—ALEX. NASH; Standish Vicarage, Stonehouse, Gloucestershire.

CHÆROCAMPA NERII IN KENT.—I have to record the capture of a specimen of *C. nerii* in the village of Stowting, in the south-east of Kent. This insect (I regret to say a very bad specimen) was taken towards the end of July indoors, apparently attracted by the light; it was captured by a lady, to whom I am indebted for sending it to me.—A. R. UPTON; Stowting Rectory, Hythe, Kent.

VANESSA ANTIOPA AT SKYE.—Mr. P. M. Ellis reports to 'The Field':—"On Sept. 10th I captured a fine specimen of the Camberwell beauty on the slopes of Scurr na Gilleann, in this island."

ACHERONTIA ATROPOS IN ENGLAND AND WALES, 1896.—

Dorsetshire.—A specimen of *A. atropos* flew into our drawing-room at Swanage on Sept. 9th. It is in very good condition.—E. V. HALL; 4, The Avenue, Brondesbury, Sept. 4th, 1896.

Lancashire.—While staying at Fleetwood, at the beginning of this month, I found several pupæ and full-grown larvæ in the potato fields. The people getting potatoes told me that they had seen many of them.—JOHN TAYLOR; 318, Chadderton Road, Oldham, Sept. 16th, 1896.

Lincolnshire.—Several larvæ have been taken near Panton and Market Rasen this August.—(Rev.) G. H. RAYNOR; Hazeleigh Rectory, Maldon, Sept. 24th, 1896.

Oxfordshire.—I have lately been presented with a fine larva of this species, taken among potatoes and bindweed at Kingston (Oxon). The larva was fed for several days on the latter food-plant, refusing potato; and it has since gone down.—A. T. MITCHELL; Gunnersbury, W., Aug. 20th, 1896.

Sussex.—Two larvæ of the above species were found in a cottage garden near here yesterday, and my gardener brought me one to-day. The coloration of the larva closely resembles its food-plant, which renders it far from a conspicuous object when at rest on a potato-stem; one example, about to pupate, has assumed a yellow coloration exactly like a withered potato-leaf.—J. H. LEECH; Ilford Manor, Lewes, Aug. 11th. I found a very fine specimen of this moth, resting on furze, on the golf links at Littlehampton, the early part of this month.—ARTHUR S. HELPS; Glenavon, Weston, Bath, Sept. 18th, 1896.

Brecknockshire.—Four larvæ were found in a small garden near Hay, one of which was forwarded to me. It is rather lighter and more brilliant in colouring than usual, and after reaching the length of over five inches has gone to earth to complete its transformations.—AUGUSTUS D. IMMS; Linthurst, Oxford Road, Moseley, Worcestershire, Aug. 28th, 1896.

EXCHANGE.

[The publication of Notices of Exchange, or of Advertisements, in the 'Entomologist' is in no way a guarantee for the British nationality, authenticity, or good condition of the Species. This Notice is not given to throw doubt on the bona fides of Exchangers or Advertisers, but to absolve the Editor from responsibility, in case the liberty allowed should be abused.] *Marked * are bred; † are high flat-set.*

Duplicates.—Dealbata, Galatea, Russula. *Desiderata.*—Numerous.—*Rev. E. B. Brackenbury; Ashford, Kent.*

Duplicates.—Exotic Rhopalocera, chiefly from Southern India. *Desiderata.*—European and Exotic specimens.—*C. G. Blathwayt; Bromyard, Worcester.*

Duplicates.—Rhopalocera, Saturniidae, and insects of other orders collected in Sierra Leone. *Desiderata.*—Foreign Lepidoptera.—*W. G. Clements; Linden Cottage, Frindsbury, Rochester.*

Duplicates.—Ligustri, Populi, Ocellatus, Capsincola,* Bondii, Pudibunda, Libatrix, Promutata,* Diffinis, Affinis, &c. *Desiderata.*—Numerous.—*W. E. Butler; Hayling House, Oxford Road, Reading.*

Duplicates.—Cossus larvæ (quarter to full fed), Bucephala ditto. *Desiderata.*—Pupæ, numerous.—*H. W. Bell-Marley; 60, Shaftesbury Road, Ravenscourt Park, Middlesex.*

Duplicates.—A few each only of Fascelina, Præcox, Albicollis, Marginata (Umbra), B. Trifolii. *Desiderata.*—Very numerous.—*T. G. Mason; 8, Lansdowne Road, Higher Crumpsall, Manchester.*

Duplicates.—Coleoptera: N. livida, C. germanica, Bem. stomoides and lunatum, Gracillia minuta, Corynetes ruficollis, Ochina, Niptus hololeucus, Chryb. sanguinolenta.—*S. Pegler; Retford.*

Duplicates.—Edusa (males), C. Album. *Desiderata.*—Athalia, Alsus, Arion, H. Comma.—*C. H. Blathwayt; Frome Bank, Bromyard, Worcester.*

Duplicates.—Pupæ of Strataria (Prodomaria) and Pavonia (Carpini); larvæ of Syringaria. *Desiderata.*—Numerous local ova and pupæ, especially Dolobrararia and Fuscantaria.—*G. R. Garland; 94, Sedgwick Road, Leyton, Essex.*

Duplicates.—Sinapis, Argiolus, Littoralis, Lineolata. *Desiderata.*—Aureola, Dictæoides, Porata, Subtusa, Paleacea, Succenturiata, Pygmæata, Pusillata, Campanulata, &c.—*Rev. E. C. Dobrée Fox; Castle Moreton, Tewkesbury.*

Duplicates.—Cribrum, Mesomella, Complana, Fascelina, Viridata, Hippocastanaria, Straminata, Subsericeata, Propugnata, Alternata, Belgaria, Flavago, Obelisca, Nigricans. *Desiderata.*—Numerous.—*W. G. Hooker; Claremont, Alington Road, Bournemouth.*

Duplicates.—Edusa, Aglaia, T. Quercus, Tiliæ, Tipuliformis, Dominula, Lanestris, Sublustris, Puta, Myrtilli, Parthenias, Prunaria, Hirtaria, Taminata, Citraria, Nanata, Minutata, Procellata. *Desiderata.*—Numerous.—*C. Levett; 107, Brockley Road, London, S.E.*

Duplicates.—Cardamines, Rhamni, Selene, Euphrosyne, Galatea, Rubi, Adippe, Corydon, Adonis, Edusa, Cardui,* Alveolus, Tages. *Desiderata.*—Other Rhopalocera. Only fine, well-set insects on black pins, with full data, sent or wanted.—*H. L. Wood; Old Grammar School House, Ashford, Kent.*

Duplicates.—Aglaia, Selene, Artaxerxes, Linea, Sylvanus, Argiolus, Quercus, Cucullatella, Zonaria, Ribesaria, L. Comma, Flavago, Valligera, Popularis, Trapezina, Dentina, Verbasci, Chrysis, Pyramidea, Typica, Pulchrina. *Desiderata.*—Numerous.—*C. Couldwell; 1, Park Avenue, Cane Street, Hull.*

Duplicates.—Ditrapezium,* Ægon, Irrorella, Falcataria,* Lacertinaria,* Camelina,* Pinastri, Suspecta* (Surrey form), Populeti, Baiularia, Ornata, Angularia vars., Nupta,* Geminipuncta,* Papilionaria (few), Phragmitidis, Hirtaria, Flavicornis, Punctularia, Lunosa. *Desiderata.*—Very numerous. Lists exchanged.—*E. H. Taylor; 52, Mimosa Street, Fulham, S.W.*

Duplicates.—Valezina, Paphia, Aglaia, Sibylla, Cardui, Galathea, Corydon, Bombyliiformis, Fuciformis, Quercus, Potatoria, Sponsa, Promissa, Pyramidea, Quercifolia, Pavonia, Blomeri, Candidata, Rubricata, Ochrata, Vespertaria, Rusticata, Muricata, Porata, Atomaria, Carbonaria, Plumaria, Betularia.* *Desiderata.*—Ancilla, Plantaginis, Chrysorrhæa, B. Rubi, Or; all the series Leucania, and many Geometers.—*Geo. Stanley Morley; Oakdene, Epsom.*

Duplicates.—O. pompeius, P. pammon, Philoxenus sarpedon, memnon, antiphates, erithronius, agamemnon, A. childreni, niphe, jainadeva, kamala, Lathonia, Paphia, Aglaia, C. aoris, C. biblis, E. crameri, core, A. nusippus, Bolina, H. lineus, daos, C. thyodamas, P. apollo, D. livornica, Spiramia various, &c. *Desiderata.*—Exotic and European Rhopalocera.—*Rev. M. Hick; Trimdon Vicarage, Trimdon Grange, R.S.O.*

Duplicates.—Lineola, Suasa.* *Desiderata*.—Many local species in fine condition.—F. Whittle; 3, Marine Avenue, Southend.

Desiderata (for new illustrated work on larvæ and pupæ).—Larvæ and pupæ of Expallidata, Corylata, Extersaria, Fasciaria, Contigua, Assimilata, Pusaria, A. Ligustri, Apiciaria, Liehenaria, Leporina, Notata, Cinctaria, Ononaria, Siliciata, Fluctuosa, Alchemillata, Reclusa, Betulæ, Edusa, Lathonia, Euphorbiata, Tridens, Fascelina, Persicaria, Helveticata, Ulmata, Arceuthata, Testudo, Ocularis. Castigata, Exclamationis, Dictæoides, Satyrata, Rectilinea, Lacertinaria, Orion, Dolobraria, Ænea, Puta, Exigua, Cardui, Bœtica.—A. W. Rollason; 1, Newhall Street, Birmingham.

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NOVEMBER, 1896.

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THE
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ARGYNNIS PAPHIA, AB.



THIS remarkable variety of *Argynnis paphia* I captured July 2nd this year in Whatcombe Wood, near Blandford. It is a male, and measures a little over two and a half inches from tip to tip of fore wings. All the lighter colouring of the fore wings is of a deep fulvous, the darker markings black, running into dark brown. In the hind wing the fulvous or ochreous colour is deeper, running into dark olive-green in the lower part of the wing. The under side of the fore wing resembles the upper surface, only lighter, and the tips are of a silvery green. The hind wings are marked with varied shades of silvery green.

H. H. TILNEY BASSETT.

Houghton Rectory, Blandford,
Oct. 10th, 1896.

VANESSA ANTIOPA.

BY W. F. KIRBY, F.L.S., F.E.S., &c.

It has been asserted by most authorities on British Lepidoptera for the last century, that British specimens of the Camberwell Beauty have much whiter borders than Continental ones; but I find that of late years an opinion is growing up, and is becoming openly expressed, that this is not the case, and that our British white-bordered specimens are only faded or hibernated. The white-bordered form is not unknown on the Continent, but seems to be very scarce in many localities; while, although the yellow form is not quite unknown with us, it is so rare (not more than two or three having been recorded) that I am inclined to regard its occurrence in Britain as purely accidental. It would be very desirable to ascertain the proportion of white- to yellow-bordered specimens in different parts of Europe; but I am not aware that anyone has investigated the subject. American specimens, again, on the average, are larger, and the border is more deeply coloured than in Continental ones. During the present autumn, it is interesting to learn that several specimens of this butterfly have been taken in Forfarshire, the Isle of Skye, and other localities in Scotland, and have been recorded in the 'Field' and elsewhere. Two of these were taken by Mr. W. R. Ogilvie Grant, who has kindly allowed me to examine them, and the borders are *snow-white*. As they are fresh specimens, the question of hibernation or fading is hardly admissible. Mr. C. W. Dale, in his 'British Butterflies,' pp. 157-162, has given a series of quotations from various English authors relating to this butterfly. I have turned up several of the older writers, and find that Donovan (1794) seems to be the first author who speaks of the specially white borders of English specimens. Only two authors figure it with yellow borders. Wilkes's figure is probably taken from a Continental specimen, for he says that he only knows of two British specimens, but that it is very common in Germany. Harris describes and figures the border as pale yellow, from a British specimen. Otherwise all the figures and descriptions which I have seen, by British authors, represent the border as *white*, though some say "dirty white." Mr. Dale is, however, in error respecting the use of the names *hygiea* and *lintneri*, the first of which, he says, denotes the white form, and the other the American form. The former name was originally used to denote two forms of *V. antiopa*, one with white and one with yellow borders. Dr. Staudinger has since restricted the name to the aberration with very broad yellow borders, involving and nearly obliterating the area usually occupied by the blue spots. In the equally rare American aberration described as *lintneri*, the yellow

border is still broader, and the blue spots are entirely absent. I may remark that the white borders of genuine British *V. antiopa*—like Mr. Grant's specimens, and the fine series in the British cabinet at the British Museum (Mr. Buckler's yellow-bordered specimen in the British Room is believed to have been bred from a larva received from Leipzig)—have a very different appearance to the borders of faded Continental specimens, which once were yellow. There are only three specimens with white borders in the general collection of the Museum; *two from Bhutan, and one (dirty white) from Japan*. Pryer, however, figures a Japanese specimen with a clear yellow border. Mr. Barrett suggests that the white-bordered British *antiopa* may come from Norway; Linné describes the border as "albidus"; and I should not be surprised to find that, outside Britain, the white-bordered form is more or less of a mountain insect. Dr. Lang says that Albanian specimens have white borders.

British Museum (Natural History), Oct. 15th, 1896.

CALOPHASIA PLATYPTERA, ESP.: A MOTH NEW
TO BRITAIN.

ON Sept. 14th last, whilst searching for land-shells near Brighton, I had the pleasure of capturing a male specimen of *Calophasia platyptera*, Esper. When I first saw the moth it was in excellent condition, but unfortunately, in consequence of not being prepared for taking new Lepidoptera, it had to be consigned to a match-box. The fringes have suffered somewhat, otherwise the insect is uninjured. I am pleased to say this pretty addition to our fauna will find a place in the collection of Mr. F. H. Briggs, of Lynmouth, Devonshire.

In appearance our new moth is like a small "shark-moth" when at rest, to which group it belongs. The genus *Calophasia* is closely allied to *Cucullia*, and in our present arrangement will precede it. I believe if the locality is carefully worked other specimens will be found. In searching for *C. platyptera* the habits of *Cucullia umbratica* should be remembered, which will aid in attaining success. A full account of the capture and description, with figure of the specimen, appears in the October and November numbers of 'Science Gossip' for this year.

JOHN T. CARRINGTON.

1, Northumberland Avenue, London, W.C.,
October, 1896.

ON THE VERTICAL DISTRIBUTION AND DERIVATION
OF THE RHOPALOCERA IN THE PYRENEES.

BY W. HARCOURT-BATH.

ON the occasion of a recent entomological expedition to the Central Pyrenees, part of my programme consisted in defining the vertical zones of vegetation, to provide a basis for studying the vertical distribution of the Rhopalocera in the region under consideration. The results arrived at, together with certain other facts and conclusions obtained during the course of the investigation bearing directly upon the subject of vertical or climatal distribution, I propose to present to the readers of the 'Entomologist' in the present paper.

The district investigated consists of that portion of the chain situated within the French Department of the Hautes Pyrenees, and may perhaps be regarded as representing the average climatal conditions of the whole range. On account of its central situation the precipitation is less than that further to the west, and greater than that which occurs in the continuation of the chain in the direction of the Mediterranean, which latter portion possesses a very dry climate indeed. The flora of this region is in character similar to that occurring on the northern slopes of the Alps, and in Cold Temperate Europe generally.

The olive zone (or, as it ought more properly to be called in this district, the pseudo-olive zone) is theoretically represented (from a climatological point of view) in the Department of the Hautes Pyrenees at the lower elevations, where the mean annual temperature rises in some situations as high as 59° Fahrenheit, but practically (from a phyto-geographical standpoint) this is not the case, for, as I have already stated, the vegetation is wholly that of Northern Europe. The olive and other characteristic trees and plants of the warm temperate zone just commence to occur in one direction about ten or a dozen miles to the east of the Department in the vicinity of Bagneres de Luchon, and in another as soon as we cross the southern watershed and descend into Spain. Theoretically this zone terminates here at about the altitude of 1000 ft., but of course there is no phyto-geographical line of demarcation between it and the one above, so that if we are to admit it at all it can only be estimated by means of a calculation.

The vine zone rises above the preceding to the height of about 1800 ft., which altitude is also considerably below the theoretical elevation it should be, based upon the mean annual temperature alone. It is, however, consistent with the conditions which exist in the zone below.

Now what are the causes of these apparent incongruities? That nature refuses to be bound by the rules of geographers, and conform with mathematical precision to the calculations of physicists, without taking all the factors into consideration, is plainly patent. The theoretical (climatological) zones defined by geographers harmonise very well on the whole with the actual (phyto-geographical) zones adopted by botanists throughout the world, and Europe in particular; but when our attention is confined to a small area, they are often found to be inconsistent in detail. It is clearly evident that other factors should be taken into account besides the mean annual temperature in estimating the horizontal and vertical limits of the vegetation. In many cases the minimum winter temperature or the maximum summer temperature has to be provided for, and this I consider furnishes the cue to the reason why the vine does not ascend to such a height in the Hautes Pyrenees as it ought to do from the point of view of the mean annual isotherm alone. Its non-occurrence above the altitude of 1800 ft. is in my idea to be accounted for by the temperature of the summer, beyond the elevation at which the plant is successfully cultivated, being insufficient to permit of the fruit ripening. A good deal of rain falls in the region in question in the summer and autumn months, which is probably the cause of the temperature being insufficient to bring the grape to perfection; hence the reason why it is not grown.

In the case of many indigenous species of plants and shrubs belonging to the warm temperate zone being unable to extend the area of their distribution even to the lowest elevations in this district, where the winter temperature is comparatively very mild, the same influence possibly operates as with the vine, the low temperature of the summer being likewise insufficient to ripen the seed, and thus not enable them to propagate their species. Perhaps it is also partially to be accounted for by their inability to compete with the more vigorous cold temperate forms which, thriving superabundantly by reason of the profuseness of the precipitation, do not afford a chance to the arid-loving forms from the southern and north-eastern sides of the Pyrenees to continue their kind.

The fauna, and particularly the Rhopalocera, of the pseudo-olive zone in the Hautes Pyrenees appear to coincide in their distribution with the flora very well. The butterflies even at the lowest elevations, with a few trifling and unimportant exceptions, partake wholly of the character of the north temperate region. It is possible that the reason of this lies in large measure in respect to the distribution of their pabula; in other instances species may be influenced directly by the amount of the precipitation, and by the temperature, in the same way as the plants.

In this connection I may here remark that in all the zones in the mountains (the same as in the Alps) it is singular how closely the distribution of the Rhopalocera coincides with that of the predominant or typical arborescent vegetation. This is particularly noteworthy by reason of the fact that very few trees and shrubs which constitute the facies of the different zones provide the pabula of the larvæ. Many low plants, on the other hand, which do constitute the food of the caterpillars, possess a wide distribution, or are represented in other zones by closely allied species. Besides the vegetation, the climate and many other factors it is evident, therefore, must be taken into consideration in order to account for both the horizontal and vertical distribution of the Rhopalocera.

The lower hill zone rises in the Hautes Pyrenees to the height of about 3000 ft. The alien but graceful locust-tree (*Robinia pseudo-acacia*) flourishes in this region, growing luxuriantly by the sides of the ravines and gorges in company with other characteristic vegetation.

The upper hill zone ascends above the preceding to the height of about 4500 ft. The most characteristic shrub belonging to it is the box, which grows in dense masses among the rocks upon the rugged mountain slopes, and produces a very typical feature in the landscape.

The lower alpine zone lies between the altitudes of 4500 and 6500 ft., but it is exceedingly difficult in many parts of the mountains to define its position with a certainty owing to the absence of conifers, which constitute the typical arborescent vegetation of this region in the Alps, and throughout sub-Arctic Europe generally. The places of the pine and fir are thus frequently occupied by the juniper and rhododendron, which, owing to the scantiness of the soil, flourish abundantly in the absence of the trees. It is thus often by no means an easy matter to tell where this region ends and the one above begins.

The upper alpine zone is the region of small bushes and stunted shrubs, and occupies the mountain slopes between the altitudes of 6500 and 8000 ft.

The snow zone, which occupies the highest and final vertical region, terminates at the point where commences the actual line of congelation, which on the northern slopes of the chain lies at about the altitude of 8800 ft.

On the southern or Spanish side of the watershed bounding the Hautes Pyrenees all the above vertical zones are a few hundred feet higher, the altitude of the lower limit of perpetual snow being about 9200 ft., this constituting a difference of some 400 feet.

Allowance being made for the difference in the latitude—about two degrees—between the Alps and the Pyrenees, the vertical distribution of the Rhopalocera in the latter range

appears to approximate very closely to that of the former, in support of which I could furnish abundant proof. It is not, however, my intention in the present paper to enter into detail; this perhaps I may be persuaded to do in some subsidiary paper on the same subject later on. I propose here to deal with general conclusions only.

One interesting fact which has struck me, in making a comparison between the *Rhopalocera* occurring at the higher altitudes in the Pyrenees with their relatives in the Alps, is the comparative less number of melanochoic or alpine forms accompanying the type, or taking their place, than in the latter range. Two theories may be put forward to account for this: 1, that the lowland or Austral types, which possess representatives in the higher zones in the Alps through being recent immigrants to the Pyrenees, have not had sufficient time to develop them in the latter range; 2, through competition being less severe or conditions less varied than in the Alps. The former seems to me to be the best view to assume, but possibly both may be to a certain extent correct.

The number of species of *Rhopalocera* occurring in the Pyrenees is considerably less than that existing in the Alps, this difference being specially noticeable in the alpine forms; thus in the genus *Erebia* only about half as many species are found in the Pyrenees as there are in the great mountain range in Central Europe.

This deficiency probably dates back as far as the glacial period, and is to be accounted for by several hypotheses. In large measure it is undoubtedly due to the isolated position of the chain, coupled with the considerably less extent of area which it occupies in comparison with the Alps. To the glacial period, however, must be attributed an overwhelming influence in deciding the present distribution of the existing *Rhopalocera* fauna. The effect it has produced is probably very profound indeed. As the ice-cap slowly advanced over the plains and lowlands of France, the butterflies gradually receded further south, until they ultimately reached the region under consideration. Here their retreat was finally and effectually cut off by the elevated mountain range rising in their rear like a huge wall, and as the ice-sheet approached its base they were in consequence, like the rest of the pre-glacial fauna, unable to surmount the barrier, and were compelled to succumb to the increasing cold. Most of the alpine forms which exist upon the higher slopes at the present day probably owe their survival during the glacial epoch to the shelter afforded them in Spain at lower levels on the southern side of the range, while nearly all the lowland forms found in the region now are probably post-glacial immigrants from countries situated to the east.

In support of this theory may be brought forward the fact

that the chain under consideration, by reason of its peculiar physical configuration, proves an effectual barrier to the dispersal, north and south, of lowland forms existing on the lower slopes upon either side. Unlike the more elevated mass of the Alps, there are no transverse valleys and passes at a comparatively low elevation which would provide the passage to and fro of such Austral or lowland types. All communication between France and Spain is thus completely severed, except in the case of those species existing in the immediate vicinity of the snow-line. Spain similarly in proportion to its southern latitude possesses a comparatively poor Rhopalocera fauna. In this case, however, less is possibly to be attributed to the effects of the glacial period than to the isolated position occupied by the Iberian peninsula; at the same time it undoubtedly has made its influence felt to a great extent.

At about the climax of the glacial epoch geologists assert that the land connection between Southern Spain and the northern parts of Africa was severed, and has been so ever since. This theory entirely accounts for why so few species inhabiting the southern shores of the Mediterranean have been able to extend their area of distribution to the north, where they could easily find a congenial home in the subtropical climate of Andalusia. At the same time no alpine forms inhabiting Europe, I believe, are found upon any of the mountains in North Africa. This would seem to suggest a date anterior to the climax of the glacial epoch for the discontinuity of the two continents. Geologists suppose that when the ice-cap attained its greatest dimensions the climatological and phyto-geographical conditions of the South of Europe must have been very similar to those which reign supreme in Scandinavia at the present day. If this was the case it must have harboured many of the alpine forms of butterflies existing then. So that, unless the discontinuity between the two continents did not take place at a date anterior to the climax, I do not understand the reason why some of them should not be retained at the present day at high altitudes upon the Atlas Mountains in Morocco and Algeria, to whence they would have retreated upon milder conditions ensuing. For if the disconnection took place before the climax, when the climatological conditions were not so severe, the alpine butterflies would not have retreated sufficiently far south in order to secure a foothold upon the African continent. The only other contingency I could see is that these conditions were not quite so severe at the climax as geologists have pictured, which is indeed supported by the fact that very few alpine forms occur upon the elevated chain of the Sierra Nevada, in the extreme south of the Iberian peninsula.

Another important item to be taken into consideration in order to account for the comparative paucity of the Rhopalocera

fauna of Spain is to be found in the extreme infertility and aridity of a large portion of its surface. If similar conditions prevailed at the time of the glacial epoch, it must have told severely against the survival of many forms which entirely depended upon its southern sanctuary for their propagation. Upon milder climatic conditions ensuing, the remnants advanced up the slopes of the Pyrenean chain to their present stations. It will thus be seen that the alpine forms occurring in the range must have been in large measure indirectly derived from Spain. The most curious thing about it is that there are so few endemic species and peculiar varieties occurring in consequence throughout the chain.

It is evident that many factors must be constantly kept in view in estimating the why and the wherefore of the present distribution and derivation of the *Rhopalocera* in the Pyrenees.

Birmingham, October 1st, 1896.

ON JUMPING COCOONS FROM S. AFRICA.

BY D. SHARP, M.D., F.R.S., &c.

At the last meeting of the Cambridge Entomological Society, Mr. Rickard kindly gave me two small oval objects known as "jumping cocoons." He had brought them from S. Africa some years previously, his attention having been attracted to them there by the fact that these apparently inanimate, earthen-looking objects execute considerable leaps, even managing to spring out of a small vessel, such as a tumbler, in which they may be placed. Some of the insects had emerged from the cocoons during the voyage from Africa to England, but Mr. Rickard had not preserved any of them, and all he recollected was that they were flies that hold their wings in a roof-like position. As the two cocoons given to me were intact, it was probable that they contained some remains, and I consequently investigated them with the hope of discovering something unusual that would explain the powers of jumping. I discovered inside what certainly is one of the most interesting pupæ I have ever seen. The order of insects to which it belongs is somewhat uncertain, but I consider it will prove to be an anomalous lepidopterous insect allied to Trichoptera.

But first as to the cocoons. These do not look like the cocoons of Lepidoptera, their appearance being that of a small piece of oval pottery, 5 mm. long, with a rough surface. They have a considerable thickness, and when broken open the inside is like the outside, though rather less rough; there is no silken lining, no polished surface. In each of the two cocoons I found a pupa; the two were quite similar, and I have no doubt belong

to the larvæ that made the cocoons. They are of a highly anomalous nature, and agree in certain respects with the pupa of *Micropteryx*, whose discovery was recently made by Dr. Chapman, though very different in other points. There are these distinctions: 1, there are no free mandibles; 2, the ventral aspect is that of an anomalous pupa incompleta of Chapman, while the dorsal aspect is that of the Neuroptera, either of Hemerobiid or Trichopterous kind, but highly peculiar. The appendages on the ventral aspect are imperfectly fastened to the body, but the wings extend quite to the extremity of the body, and are free, as to their edges, on the dorsal aspect. The front of this soft imperfectly chitinised pupa bears a hard projecting chisel, which differs from all the rest of the pupal surface in that, instead of being pallid and membranous, it is dark, hard, and strongly chitinised. The dorsal aspect of the abdomen is *sui generis*, for though soft it is thrown into several series of ridges or folds, each of which bears a projecting, chitinous, acuminate tubercle; the structure of this dorsal part of the abdomen indicates great mobility of the segments on this aspect of the body. There are seven of the rows of ridges, 8-12 in each row; the longest and strongest are curved backwards. The most remarkable of all the features of this pupa is that the pleura of the abdomen are developed as large free flaps, which bear numerous long and strong setæ. There are also a few long setæ projecting from other parts of the body.

With these data we can make a fair guess at the *modus operandi* of the insect. This little pupa is shut in a remarkably hard thick cocoon without any orifice, and it has to get out. Nature has not provided it with caustic potash for the purpose, but has endowed it with a mechanism of complex perfection to accomplish this little object. On the front of the head it has a sharp chisel edge, and with this it has to cut through the pot-tery; contracting itself to the utmost in the posterior part of the cocoon, and retaining itself in this position by the hooks on the mobile part of the body, it is in a condition of elastic tension in consequence of the other side of the body being so differently formed and immobile; therefore, releasing the hold of the hooks, the pupa is discharged forwards, and the chisel piece strikes the front part of the cocoon; repeating this an enormous number of times a circle may be gradually inscribed on the inside of the far end of the cocoon, which gives way when sufficiently weakened, and the insect becomes free. In both the specimens the inside of the cocoon is about half-cut through; either this is done as the result of a prolonged series of wriggles, or of shocks such as I have described. It is by no means improbable that the early part of the performance is carving the groove by wriggling, the later part knocking it off by jumping against it. The pleural setæ are doubtless the sense organs that co-ordinate the movements.

In order to rear this insect successfully it is clear that the cocoons should be fixed. I therefore venture to suggest that anyone having the opportunity should take a strong flat piece of card; make some little holes in it, and then, by means of Leprieur's gum, *used very thick* so as not to penetrate the cocoon, secure one side of each cocoon in one of the card hollows, and they will then probably facilitate the exit of the imago.

As to the order to which the insect belongs, I may remark that, as the pupæ inside the cocoons were both mouldy and dirty from exudation, they had to be cleaned, and in order to see some points of the structure I separated the abdomen of one of the pupæ from the rest of the body; in doing so I wounded the delicate integument of the wing-sheaths and leg-sheaths, and I find that these contain a profusion of scales of peculiar form, but no doubt, I think, of a lepidopterous nature. The antennæ are very long, with free tips; and altogether I consider that the insect will prove to be an anomalous lepidopteron, possibly somewhere near to *Adela*.

Mr. Rickard informs me that he obtained these cocoons at Shark's River, three miles west of Port Elizabeth.

Cambridge, Oct. 17th, 1896.

NOTES AND OBSERVATIONS.

REARING *ACHERONTIA ATROPOS*.—In reply to Mr. Walker's query (*ante*, p. 311) as to rearing this insect, I may say that I believe it to be extremely sensitive during the resting stage underground previously to becoming a pupa, a period which, in the case of the larvæ I had, was about three weeks. These larvæ did not make cases of a solid character, but each one, about an inch or two below the surface, reduced the soil to a very nice uniform condition of fineness for an area of a quarter of an inch or more around itself; this prepared soil was only fastened together so very lightly that a very slight disturbance ruptured it. I wished to examine these specimens to see the condition in the resting stage, and in doing so I broke the earthen case of one, but put it together, as I thought, very nicely; a deformed pupa was, however, produced. I have no idea how the larva operates on the soil, but the pupa of *atropos* is excessively active with its abdominal segments, far more so than any pupa of its kind that I know of. The sixth to eighth segments of the pupa are very deeply impressed and ridged on each side, and this condition is correlated to the capacity of movement; for, though the sculpture I speak of looks quite shapeless, yet when the pupa is fully bent laterally, the largest ridge—close to the stigma—exactly fits to the side of the preceding segment. As to the condition in which Mr. Walker should keep his pupæ, I presume practical lepidopterists would say, out of doors.—D. SHARP; Cambridge, Sept. 29th, 1896.

My last communication to you has caused so many letters to me, from correspondents who cannot consult your previous volumes, that I am led to beg for space in your next issue, that I may shortly repeat my directions for forcing the pupa of *A. atropos*. I half fill a ten-inch garden-pot with sand, place on the top a layer of damp moss, lay on it the pupæ, and cover these again with another layer of moss; arrange some sticks round for the moth to climb, and cover with a bell-glass, as used by gardeners, to fit inside the rim of the pot. Put into a soup-plate containing water, and place the whole arrangement inside the dining-room fender, not too close to the fire, turning the pot round occasionally to equalise the heat, and adding more water to the plate when it gets low. If this is done at the end of October, the perfect insect may be looked for about Christmas. It generally emerges towards night, the pupa becoming dark and soft, and turning on its back shortly previous to the emergence.—H. W. LIVETT; Wells, Somerset.

In reply to Mr. Edward R. Walker's queries as to the best method of breeding this species, I have much pleasure in furnishing him with an account of the means I adopted some years ago with perfect success. I forget what year it was, but larvæ and pupæ of *atropos* were more than usually abundant. I went round to different fields where potato-digging was in operation, and showed the men drawings of both larva and pupa, and told them that I would give twopence each for any they might find. The consequence was that in a day or two I had a couple of dozen of larvæ and pupæ brought to me, and had to tell the men that I did not want any more. The larvæ were nearly all full grown, and went down in a few days. I had endeavoured to breed this species the previous year, but had failed altogether; so I thought I would try some other plan. When the larvæ had been underground for three weeks I dug up the pupæ. I then procured a large flower-pot, filled it half full of gravel, upon which I placed a layer of damp moss, about two inches thick, and upon this the pupæ, covering them with another layer of damp moss about an inch thick. A piece of muslin was then tied over the top, and the pot placed on the kitchen mantelpiece. Twice a week the layer of moss above the pupæ was taken out, plunged into a basin of tepid water, wrung out, and replaced. The moths began to appear in about a month's time, and from twenty pupæ thus treated nineteen moths appeared, only one being a cripple. A day or two before the moths emerge the pupæ begin to change colour, until they become nearly black, and at this period feel very soft to the touch, and, if handled a few hours before hatching, the moths may be heard squeaking within. I believe that I sent an account of this at the time to the old 'Entomologist's Weekly Intelligencer' [vol. v. p. 69, Nov. 27th, 1858].—GERVASE F. MATHEW; H. M. S. 'Hawke,' Salonica, Oct. 14th, 1896.

We have just had the pleasure of successfully rearing an imago of *A. atropos*. The larva (from Northamptonshire) pupated about Sept. 15th. On the 27th we placed the chrysalis in the forcing apparatus designed by Mr. Sturt, which was described in the 'Entomologist' for July by Dr. Guard Knaggs. The moth—quite perfect—emerged on October 15th, after being in the "incubator" for eighteen days, the water being kept at about 105°.—A. R. and R. H. HEATH; Willesden, Middlesex.

VANESSA C-ALBUM.—MRS. E. S. Hutchinson (*ante*, p. 312) claims to have first discovered the light form of this butterfly in England. With due respect permit me to say that I never attempted to claim this discovery. What I do profess to have discovered is that it only occurs as an aberration of the first generation in the season in this country. In conformity with the law of priority in nomenclature I am quite willing to substitute the name of "*hutchinsonii*" for that of "*lutescens*," if your correspondent will kindly inform me where a definition of the form under that cognomen was published, and if it is one of the magazines or works recognised by the editors of the 'Zoological Record.' With regard to the results obtained by breeding the larvæ of this insect in captivity, they prove nothing; and Mrs. Hutchinson appears to miss the most important point, in referring to the same, in her omission to mention the environment of the caterpillars, whether they were reared indoors or out of doors, and what was the temperature previous to the emergence of the imago. It is well known that very different results can be obtained by rearing Lepidoptera under artificial conditions to what is the case in a state of nature. In support of this I may say that a larger proportion of the light form of this butterfly are produced in captivity than at large in a state of freedom, as I have had ample opportunity of proving. What I should much like to know from your correspondent is the relative proportions between the two forms occurring in a state of nature each season for a number of years back, and the climatological conditions prevailing at the same time.—W. HARCOURT-BATH.

UNIFORMITY IN PINNING AND SETTING LEPIDOPTERA.—In the course of this interesting discussion it seems surprising that no one has suggested as a remedy for the existing state of things the disestablishment of the pin in its present form. However well pinned an insect may be, it must be admitted that it would look far better if there were no pin visible at all. As a substitute I would suggest the adoption of a small double prong, something in the shape of a reaping-hook; the part representing the handle would end in a point, and would stand vertically in the cork; from this would diverge two arms like those of a capital Y; these would each curve over until they ended in a horizontal direction in two points, which would be inserted at the side of the thorax, underneath where the wings join it, and thus in the set specimen the apparatus would be totally out of sight. The advantages of some such contrivance as that which is here rather lamely described would be considerable. In the first place, the beauty of the thorax in many species would not be spoilt as is at present inevitably the case; secondly, the specimens would be well raised above the paper and out of the way of mites, while at the same time they would not stand so high as to give what most English collectors consider the ugly effect of high-setting; besides this the absence of a pin through the thorax would give a more natural effect to a set specimen. Setting might with this arrangement at first present difficulties, but they would probably not be insuperable. Insects would be moved by clasping the upright part of the apparatus with forceps. The size of the new pins could be regulated in the way suggested by Mr. Tunstall in the last number, though it would probably be best to

keep all specimens at the same height. — D. P. TURNER; Tonbridge, Oct. 6th, 1896.

There is no doubt some general rule should be laid down for the above, especially for collectors of British Lepidoptera. Exotic collectors are so few and far between that I think they might be left to fight their own battles. But who likes to see British insects set flat? Insects so set are classed "continental" at once. Who among the collectors who give long prices for insects (because they are caught this side of the Channel) would look at such insects on long pins, set flat? I think everyone will agree with me that flat-setting is ugly, wooden, and contrary to the laws of nature—therefore unnatural. A drawer of flat-set Lepidoptera always look to me as if they were made of paper. I suppose this is because one is accustomed to see them so in pictures. Of course I understand one principal reason is to show as much of the wing as possible, but there is nothing to prevent collectors having one or two specimens so set (my remarks refer more especially to those who have a long series); there is surely no necessity to set all flat. Let any who have doubts go and look at Hewitson's magnificent collection in the Museum, and compare it with a German collection.—WALTER DANNATT; Ivy Dene, Westcombe Park, S.E.

ENTOMOLOGIST *v.* COLLECTOR.—MRS. E. S. HUTCHINSON (*ante*, p. 313) publishes a very indignant note respecting the imaginary discourtesy of those who denounce the "mere collector." I fail, however, to see what courtesy and discourtesy have to do with it, but consider it more a matter of truth and logic. If a person possesses a pronounced opinion upon any subject, and has the courage of his convictions, I do not see that he deserves to be denounced as being discourteous, unless, of course, he published his opinions with the direct purpose of causing anybody annoyance. It is a matter entirely concerning principles instead of personalities. Your correspondent recommends the Rev. W. Claxton to "note" those who are so discourteous as to condemn the "mere collector." Well, I can supply the first instalment to the list, in the name of that great and highly respected entomologist, the late H. W. Bates, who professed a profound contempt for the "mere collector" (see 'The Life and Letters of Charles Darwin'). — W. HARCOURT-BATH.

May I be allowed a few remarks on Mr. Claxton's note and the Editor's reply, pp. 286-7? I think that most of us rather despise those who form collections of pictures without in the least being able to appreciate their merits. So also with collectors of insects; it is reasonable, I think, to expect them to collect intelligently, and so far to be scientific. But it seems to me absurd to suggest that the ordinary untrained individual can do nothing for science in the course of his collecting. The great need of Entomology at the present day is intelligent field-collectors, who will notice and record what goes on before them; people who can see things that are not mentioned in their text-books. Such observers should be aided by those whose training and knowledge of the literature enable them to pick out the new and valuable points in the observations. I have lately published a good deal on wild bees, and anyone who will look at my papers will see that nearly all contain references to assistance

received from young people who have no special knowledge of Entomology,—some of them children. We have on foot a movement to interest the children in all the schools of New Mexico in natural history, and at the same time make them useful workers in the cause of science. It is just as easy to be scientific in this sense as to collect unintelligently, and a thousand times more delightful. To prove my point, I will by letter suggest a course of study to any collector who will follow it and report results after six months. He should state where he will reside, what he is collecting, and how much time he has to collect in.—T. D. A. COCKERELL; Mesilla, New Mexico, U.S.A., Sept. 6th.

THE GEOGRAPHICAL VARIETIES OF *PARNASSIUS APOLLO*.—Why should not the different geographical varieties of this fine butterfly receive cognomens? This degree of variation ranks next in importance to the type, and is by far more worthy of distinctive recognition than either a seasonal variety or an aberration, for it is practically an incipient species, which the other forms have not so much right to be called. Taking the prevailing form found in the Alps as the type, we have in the Pyrenees a well-marked geographical variety, consisting in the lighter colouring of the male and the darker colouring of the female, the sexual dimorphism thus being very pronounced, which is due to the disappearance and development of the black scales respectively. The male is especially distinguished by the almost total suppression of the dusky patch near the angle of the inner margin of the posterior wings, and in the almost total absence of the submarginal wave-like bands, particularly in the posterior pair. In this latter particular it is the antithesis of the form found in Scandinavia which possesses this wavy band of dusky scales very pronounced. The form occurring in the Alps seems to be intermediate between the two, and it possesses aberrations bearing a resemblance to them both. On the other hand, the Pyrenean form possesses occasional aberrations approaching the alpine type. The specimens from Siberia are larger, according to various authorities, but I do not know in what other particulars they differ from the type. In this connection I may remark that the specimens of this insect which I have taken in the Jura are larger than the type from the Alps, and seem to be an approach towards the Siberian form. I beg to suggest that the three geographical varieties which I have defined be respectively called *pyrenaica*, *scandinavica*, and *siberica*. It is very possible that the form found in the Caucasus is worthy of a varietal cognomen, but I have not seen any specimens from this region. All the specimens of *P. apollo* from the Alps, the Pyrenees, and the Jura may be divided into two sets according to their tints, in one of which it is of a delicate cream colour, although in the majority of specimens it is white. Altitude does not appear to have anything to do with it. I should like to suggest the name *pulchella* for the cream-coloured form.—W. HARCOURT-BATH.

MELITÆA DIDYMA var. *ALPINA*.—This melanistic variety appears to possess a wide area of distribution in the mountain ranges of Europe, for, in addition to the Alps, I have encountered it in the Pyrenees,

besides seeing it in a small collection of Lepidoptera from the Caucasus. In the Alps it occurs at a comparatively low elevation, having been found by me in abundance a little below the altitude of 2000 ft. It does not appear to be so common in the Pyrenees.—W. HARCOURT-BATH.

COMMITTEE FOR THE PROTECTION OF BRITISH LEPIDOPTERA IN DANGER OF EXTERMINATION.—The first meeting of this Committee, appointed by the Entomological Society of London, was held at the Society's Rooms, on Oct. 14th, 1896, Professor Meldola, President of the Society, in the chair. Letters from the City of London Entomological and Natural History Society, the North London Natural History Society, and the Leicester Literary and Philosophical Society, expressing warm sympathy with the object of the Committee, were read. After discussion of the best methods of securing the objects of the Committee, it was resolved to invite information as to species in special danger of extermination, with a view to future action.—CHAS. W. BARRETT, Hon. Sec.; 39, Linden Grove, Nunhead, S.E.

CORRECTIONS.—P. 296, Roman numeral **I** (accidentally broken off in printing) should begin first line of label. P. 310, line 3, Miss G. E. Ormerod was born December 23rd (not July 23rd), 1823.

CAPTURES AND FIELD REPORTS.

LARVÆ OF CALLIGENIA MINIATA EATING IMAGINES OF THE SAME SPECIES.—I had a batch of the larvæ of *C. miniata*, and some of them have already attained the perfect state, whilst others are still feeding. The most remarkable thing, however, is that the larvæ have seized on and devoured the moths, although they were well supplied with their proper pabulum in the shape of lichen. In attacking the moths the larvæ fasten on to the top of the wing, and then proceed to eat the head and wings first and afterwards the thorax and body.—C. J. BODEN; 204, Hanover Buildings, Tooley Street, S.E., Sept. 12th, 1896.

APORIA CRATÆGI IN KENT.—I have the pleasure to record the capture of this insect, which as a British species is I believe almost extinct, in a locality in Kent where it has previously been taken and recorded. I do not care to give the exact locality, believing it to be the only one in England where the butterfly now occurs, for if it became generally known the species would undoubtedly in a very short time be exterminated. I may say that the insect is confined to an area of about a few hundred square yards.—H. DOUGLAS STOCKWELL; 2, Albert Road, Dover.

CHEROCAMPA NERII NEAR DARTMOUTH.—I was paying a visit to a Mr. Owen, who was then living at Stoke Henning, near Dartmouth, in September, 1892, having been asked down to make the acquaintance of one of his boys who had a strong taste for Entomology, and to whom I had sent now and then duplicate butterflies and moths. On seeing him almost the first words he uttered were, "What do you think, Mr. Morres, we caught the other day on the honeysuckle on the verandah—an oleander hawkmoth!" On seeing me look rather incredulous he brought it to me on the setting-board, when it proved a fine specimen of *C. neri*, and of an

unusually dark colour, at least many shades darker than some half-dozen specimens that I have hatched out since then from larvæ taken in the Nerira Valley between Ventimiglia and Bordighera, in N. Italy. On writing last week to my friend about it, he replied, "The weather had been warm and foggy; and for several nights we had noticed a large moth come to the honeysuckle over the verandah; it had a very strong flight, and would not be caught. At last my father succeeded in taking it; but its back was a little rubbed in putting it into the smelling-bottle. The colours are as fresh and bright now as when it was taken." I would add, however, that the injury was so slight as not to damage it as a cabinet specimen.—(Rev.) ARTHUR P. MORRES; St. Nicholas, The Close, Salisbury, Sept. 19th.

LYCENA ARGOLUS.—I do not know whether this butterfly has been generally abundant this season; but in places I have visited it has been exceptionally so. When in Carmarthenshire I found it, the latter part of April and in May, unusually common. Again, in parts of Somersetshire in July the second brood might be seen in town gardens, in lanes over hedges at the bramble-blossom, and the outskirts and open spaces of woods. There appeared to be a large number of female specimens often flitting over the ivy and visiting the bramble-bloom. I watched those on the latter on several occasions, but they appeared only to be attracted by the sweets thereof.—T. B. JEFFERYS; 17, New King Street, Bath.

LEUCANIA EXTRANEA.—I have the satisfaction of recording the capture by myself of *Leucania extranea*, at sugar, in the New Forest, on Oct. 8th. The specimen is a good one, slightly smaller than the illustration given by Newman.—(Rev.) GEOFFREY HUGHES; Woolston Vicarage, Oct. 15th, 1896.

VANESSA ANTIOPA IN OXFORDSHIRE.—As I was taking a constitutional along the Oxfordshire side of the Thames on Sept. 7th, I had the pleasure of seeing a fine specimen of *Vanessa antiopa* sail close by me, and settle on the end of a lower branch of a large elm, within about two or three feet of where I was. Not having my net with me, I failed to capture it, although I tried to do so with my hat.—W. BARNES; 7, New Road, Reading.

VANESSA ANTIOPA IN LINCOLNSHIRE.—On Friday, September 11th, at the Manse, Bracebridge, Lincoln, I took a perfect specimen of *V. antiopa*. It was sitting on the raspberries, and near some plum trees, the fruit on which was then over-ripe.—G. M. ELLISON; Bilton Grange, Rugby.

AVENTIA FLEXULA AT CHICHESTER.—On June 23rd I captured a freshly-emerged *Aventia flexula* here, in quite a different locality to that in which I took the specimen recorded by me last year. It is singular that this moth appears to be met with only singly. Although the place was frequently visited and well-worked subsequently, not another specimen could be found. Perhaps some of the readers of the 'Entomologist' may be able to give information respecting the habits of this interesting moth, which may aid in the capture of more specimens next season.—JOSEPH ANDERSON, JUN.

COLIAS EDUSA AT CHICHESTER.—I know of only one specimen of *Colias edusa* being seen here this season.—JOSEPH ANDERSON, JUN.

SIREX JUVENCUS AND *S. GIGAS* AT CHICHESTER.—Two specimens of *Sirex juvencus* and several *S. gigas* have been taken in this neighbourhood this autumn.—JOSEPH ANDERSON, JUN.

HELIOTHIS ARMIGERA IMPORTED WITH TOMATOES.—On June 4th I received about twenty nearly full-grown larvæ that had been found among Valencia tomatoes. They were very combative in confinement. The larger seize the smaller ones, and throw them two and three inches away. They were kept out of doors. I touched one with my little finger; it turned sharply round and bit me, causing slight pain, but did not break the skin. The surviving larvæ had all gone down by June 17th. I reared only seven moths; they appeared on July 17th, 18th, 19th, 20th (two), 21st, and 25th. On Sept. 24th I received one larva (second brood, I suppose) which had been imported with Lisbon tomatoes.—J. ARKLE; Chester.

RHOPALOCERA IN ESSEX.—On July 19th I saw five *Euchloë cardamines* (males) flying along the railway bank off Leigh, all in good condition. On the same date *Vanessa polychloros* was fairly common between Southend and Shoeburyness; but as they kept well out of reach I was unable to take any. I saw only one specimen of *V. io*; but *Pararge megæra* was plentiful, also *Hesperia thaumas*.—G. R. GARLAND; 94, Sedgwick Road, Leyton.

ABNORMAL SPECIMEN OF NEMEOPHILA PLANTAGINIS.—I should like to record the breeding of an abnormality of *N. plantaginis*, in which the hind pair of legs are replaced by miniature wings.—W. WOODWARD; 112, Northumberland Park, Tottenham, N., Sept. 10, 1896.

UROPTERYX SAMBUCARIA IN OCTOBER.—I was much surprised while passing a street lamp here, on Oct. 2nd, to see a specimen of *U. sambucaria* clinging to the glass. Mr. Bird mentions having bred this species on Sept. 17th (Entom. xxvi. 303). It seems therefore evident that in suitable seasons a certain proportion of the larvæ of *U. sambucaria* do not hibernate, but produce imagines the same year, as is the case with many other species which usually hibernate in the larval stage.—ALFRED SICH; Villa Amalinda, Burlington Lane, Chiswick, Oct. 5th, 1896.

EMERGENCE OF SMERINTHUS POPULI IN AUGUST.—I had a fine fresh *S. populi* sent me from Rhyl on Aug. 12th. It is a good-sized male, paler and much less strongly marked than the specimens which emerged in my breeding-pots on May 12th, 16th, 22nd, 23rd, and June 4th, 11th, and 25th.—J. ARKLE; Chester.

SMERINTHUS POPULI IN SEPTEMBER.—A female specimen of this species was taken at Macclesfield, in Cheshire, during the first week of September. She deposited a batch of infertile ova.—RICHARD SOUTH.

EMERGENCE OF EUPITHECIA PULCHELLATA IN AUGUST.—On July 23rd I picked about thirty full-grown larvæ from foxglove flowers in Delamere Forest. A fine imago emerged on Aug. 21st.—J. ARKLE; Chester.

PARASITES OF PACHNOBIA ALPINA.—I have just returned from Rannoch, and have bred, from infested pupæ given to me by Mr. Salvage, a male and female of an Ichneumon allied to, or a variety of, *Amblyteles uniguttatus*, Grav., and several of a *Pteromalus*, apparently a new species somewhat allied to *P. catillus*, Walk.—C. W. DALE; Glanvilles Wootton, July 6th.

HEMIPTERA-HETEROPTERA AT LIGHT.—Last year, at Offley, near Hitchin, on Aug. 22nd, during a heavy thunder-storm, a specimen of *Corixa striata* flew into a room, evidently attracted by the light. This year, during June, a species of *Psallus* (probably *varians* or *variabilis*, from an oak tree close by), and on Sept. 16th a specimen of *Lygus pabulinus*

alighted on my book whilst reading by gaslight at an open window at Dulwich. Each of these three events took place between 9 and 10 p.m.—R. M. LEAKE; 15, Alleyn Park, W. Dulwich, S.E.

A FORTNIGHT IN S. DEVON.—On Aug. 1st I started from home to join my friend the Rev. E. C. Dobrée Fox, for a fortnight's entomology on the coast of S. Devon. The weather was delightful all the time, and we had very fair success. Among our captures were *Lithosia caniola*, *Leucania albipuncta*, *L. putrescens*, *Hydræcia nictitans*, *Caradrina ambigua*, *Agrotis puta*, *A. saucia*, *A. obelisca*, *A. lucernea*, *Plusia festuæ*, *Acontia luctuosa*, *Gnophos obscurata*, *Acidalia marginepunctata* (promutata), *Aspilates ochrearia* (citraria), *Ligdia adustata*, *Larentia olivata*, *Eupithecia subfulvata*, *E. oblongata* (centaureata), *E. pumilata*, and *Melanippe galiata*. Common moths were abundant, especially *Leucania pallens* and *Agrotis exclamationis* and *A. segetum*.—F. C. WOODFORDE; Market Drayton.

RARE NOCTUÆ IN THE ISLE OF WIGHT.—I have much pleasure in recording the capture of *Leucania vitellina* by Mr. John Hodges, at Freshwater, on September 8th; I saw the specimen shortly after capture, and Mr. Hodges was kind enough to add it to my collection. I was fortunate enough to obtain two specimens of *Leucania albipuncta* and four of *Caradrina ambigua* during my stay at the above-mentioned spot.—P. W. ABBOTT; Four Oaks, near Birmingham, Oct. 6th, 1896.

CAPTURES AT LAMP-LIGHT.—About 11 p.m. on the night of Aug. 8th last, while sitting in my "lamp" room here with my friend Mr. W. R. Ogilvie Grant, of the Natural History Museum, South Kensington, we received a most unexpected and extraordinary visitor in the shape of a skylark (*Alauda arvensis*). I need hardly say that, after being identified, it was promptly released, and, unlike many moths under similar circumstances, it did not try a second visit. It was a dark still night and we were taking a good many moths, though none of any note, *Noctua rubi* and *Pionea forficalis* furnishing nearly half the "bag." We imagine the bird was disturbed from its roosting-place in the meadow below the house by a moving cow or sheep, and then, dazzled by the light in the window, was compelled to fly towards it. I have captured bats, beetles, and other "outsiders" at lamp-light before, but never a bird! I have been taking both *Paraponyx stratiotata* and *Acentropus niveus* at the light in the same room. There is a small stream, now nearly dry, about two hundred yards from the house, but no marshy ground or river-side vegetation for some distance. I took altogether four *A. niveus*, three of them on one night (August 12th), and four *P. stratiotata*. A *Vanessa urticæ* came into the room on the night of August 4th. I was rather surprised at this, but my friend Dr. E. Wood, of Yalding, tells me that he has known one or two of these butterflies to come to a light before now.—SAVILE G. REID (Capt.); The Elms, Yalding, Sept. 1st, 1896.

ACHERONTIA ATROPOS IN ENGLAND AND WALES, 1896:—

Berks.—I have had six pupæ of the above insect brought to me this autumn, and have heard of many others being found. The previous records in my note-book are three larvæ, 1885; two pupæ, 1889.—W. E. BUTLER; Hayling House, Oxford Road, Reading.

Cheshire.—During the last month five larvæ and one pupa were brought to this museum from various parts of Cheshire, and I learn from my friend Mr. J. W. Roberts, of Barmouth, that several larvæ have been taken in his

district.—ROBT. NEWSTEAD; Grosvenor Museum, Chester, Sept. 29th. On Sept. 7th Mr. J. Lyon Denson, of Chester, showed me a full-grown larva of *A. atropos* taken about three miles from the city. This makes at least the seventh taken in the neighbourhood during the latter part of this summer and beginning of autumn.—J. ARKLE; Chester.

Essex.—Several larvæ of *A. atropos* occurred in the neighbourhood of Dovercourt at the end of August.—GERVASE F. MATHEW.

Kent.—On August 17th a brother of mine found, at Hawkhurst, Kent, a very fine yellow example of the larva of *A. atropos*; it has since gone to earth. I have known of others taken in this neighbourhood at intervals since 1876.—J. ADAMS; 41, Whyteville Road, Forest Gate, E.

Lincolnshire.—Larvæ and pupæ of this beautiful moth appear to have been unusually abundant this year in the potato-fields in the Long Sutton district during August and September. Being there on August 17th, my brother from London met me, with a fine larva taken from the top of a potato barrel the day before in the Nine Elms Railway goods-yard. At an early hour on the 19th a boy brought me another fine one, picked up in the street opposite the police-station, both being of the yellowish tint, and both, when put into a flower-pot with earth, buried themselves at once in order to pupate, which they did. From the last-mentioned date up to Sept. 30th I have received over one hundred and fifty pupæ; several have died, either from the handling by the potato-pickers or bad packing during transit. I have this morning received another box of fifty, and am expecting more, so have already received upwards of two hundred.—W. BROOKS; Grange Hall, Rotherham, Oct. 10th, 1896.

Sussex.—Larvæ of *Acherontia atropos* have been somewhat plentiful in the Chichester district again this season, the first being found on July 22nd, the last on Sept. 1st. On July 17th a fine moth—a loud squeaker—emerged from my last year's pupæ, of which I had eleven, and from which I succeeded in bringing out only three perfect specimens. I have had thirteen larvæ in my possession this year.—JOSEPH ANDERSON, JUN.

RHOPALOCERA FROM COLWYN BAY.—I spent the latter half of August at this fastly-increasing seaside resort, during which I was favoured with the most desirable weather. Although most of the species of *Rhopalocera* which I came across are more or less common, the following will show that Colwyn Bay is not a bad place for them, even towards the end of the season; in fact I have heard that nearly forty different species occur, or have occurred, in the immediate neighbourhood:—*Pieris brassicae* and *P. rapæ*, very common; *P. napi*, extremely abundant; *Lasiommata egeria*, very abundant, especially on the borders of the Pwllcrochan Woods; *L. megæra*, abounds in almost every situation; *Hipparchia semele*, common among the rugged slopes of Bryn Euryn and on the Little Orme's Head (I have observed it resting in considerable numbers on the face of the bare rock); *H. ianira*, common everywhere; *H. tithonus*, fairly common; *Cænonympha pamphilus*, very common; *Vanessa atalanta* and *V. io*, a few newly-emerged examples seen; *V. urticae*, second brood well on the wing; *Argynnis paphia* was over (I only saw one straggler); *A. euphrosyne*, one example only; *Polyommatus phleas*, common; *Lycæna icarus*, extremely abundant; *L. agestis*, sparingly at Bryn Euryn, but common on the Little Orme.—AUGUSTUS D. IMMS; Linthurst, Oxford Road, Moseley (near Birmingham), Worcestershire, Aug. 28th, 1896.

SOCIETIES.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —
August 27th, 1896.—R. South, Esq., F.E.S., President, in the chair. Mr. Montgomery exhibited a beautiful xanthic example of *Epinephele tithonus* taken at Jevington on July 27th, all the usually black area being a rich dark fulvous. Mr. Auld, this year's results in breeding *Abraxas grossulariata* in the neighbourhood of Lewisham. Mr. Adkin, a head of flower-buds of ivy with ova of *Cyaniris argiolus* in situ, and made some remarks upon the habits of the species. Mr. Manger, a specimen of *Eugonia polychloros* taken on May 24th at Brockley. It was suggested that the larva fed on poplar, as no elm was known to occur in the neighbourhood. Mr. Moore, specimens of *Papilio daunus* and *P. cresphontes* from St. Augustine's, Florida; also several specimens of the "walking stick," *Anisomorpha buprestoides*, which when seized will spurt a strong acid vapour from exceptionally large glands placed in the sides of the thorax. Mr. Mansbridge, a bred series of *Polia chi* from a dark female taken near Huddersfield. Several examples were dark, having all the lines, bands and markings of var. *olivacea*, but without any trace of the olive-green shade of that variation. Mr. South, two specimens of *Caradrina ambigua* taken by Mr. Woodford near Exmouth in July this year. The specimens were unusually pale and glossy. In answer to a question from Mr. Barrett, Mr. McArthur said that the larva of *Hadena adusta* spun its cocoon in the autumn, but did not turn to pupa till the spring. He had repeatedly found them at the roots of moss. Mr. Auld reported that var. *nigrata* of *Limenitis sybilla* had been taken in some numbers this year. He also knew of a specimen of *Polyommatus icarus* having no vestige of spots on the under side, and a var. of *Argynnis paphia* possessing a pale border and a dark centre. Mr. Turner had taken the second brood of *Zonosoma annulata* in N. Kent, and three specimens came to sugar. Mr. Adkin had spent a fortnight at Eastbourne, but had seen no *Colias edusa*. Mr. South's experience in Suffolk was of the same negative character. Mr. Mansbridge had heard that the species was to be taken on the east coast. Mr. Tutt during a month spent in S. France had seen but half a dozen, in fact it always appeared scarcer than *C. hyale* on the Continent. Mr. Tutt asked if there was any direct evidence that *Pyrameis cardui* hibernated as an imago. He had failed to find any authenticated record. In N. Africa Mr. Eaton had reported the larvæ as feeding during the winter. Mr. Barrett had seen imagines in late autumn and again in spring, but knew of no positive evidence of the species being found in winter.

Sept. 10th.—W. Mansbridge, Esq., F.E.S., in the chair. Mr. A. E. Hall exhibited a gravid female of *Termes bellicosus* from Cape Coast Castle, and a series of captured *Callimorpha hera* from Newton Abbot. Mr. Lucas, a female of *Platetrum depressum* having the male blue coloration, a male *Calopteryx virgo* having the right fore wing without the dark pigment, and a pair of the rare grasshopper *Thamnotrizon cinereum* from the New Forest. Mr. Montgomery, a bred series of *Dianthæcia capsicola* from Eastbourne; one specimen had a wide sub-marginal line and a marginal area without the wavy lines.

Sept. 24th.—C. G. Barrett, Esq., F.E.S., in the chair. Mr. R.

Adkin exhibited living larvæ of *Cyaniris argiolus* in situ on the buds of ivy-blossom from Eastbourne, also full-fed larvæ of *Aplecta occulta*. Mr. Filer, a fine variety of *Enodia hyperanthus*, having the white spots surrounded by yellow rings only, the black rings being entirely obsolete; it was taken in Essex. Mr. Moore, specimens of *Thelyphonus giganteus*, a species midway between the scorpions and the spiders, from Florida, and contributed notes; also he showed specimens of *Polistes annularis* and a nest. Mr. Turner, a varied series of *Noctua xanthographa*, including a black form, a pale form, a red form, and a form with unusually well-defined stigmata; a very dark *Agrotis segetum* from Kent; a *Triphana pronuba* with a remnant of a discoidal spot; and two bred *Acronycta aceris* with the veins of the secondaries deeply lined with black. Mr. Montgomery, specimens of *Noctua ditrapezium* from S. Yorks. Mr. Barrett, very long and varied series of *Tephrosia biundularia* and *T. crepuscularia*, and sought to establish the identity of the two forms. After considerable discussion it was decided to adjourn the matter for further consideration at the next meeting, to give members the opportunity of exhibiting their own series.—HY. J. TURNER, *Hon. Report Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—July 20th, 1896.—Mr. P. W. Abbot, Vice-President, in the chair. Mr. E. S. Haines, Danetree House, Stourbridge, was elected a member of the Society. Exhibits:—By Mr. R. C. Bradley, a specimen of *Sesia culiciformis* taken in his garden at Sutton. Mr. P. W. Abbot said that he believed it to be quite a new record. He had been taking the species, together with *S. cynipiformis*, in the larval stage at Wyre Forest, the latter species having been quite common in the oak stumps. He had also taken *S. cynipiformis* in Sutton Park a few years back. He had found larvæ in all stages and pupæ as well of *S. cynipiformis* at Wyre Forest all together last May. By Mr. Wainwright, *Chærocampa elpenor*, a single specimen taken by Mr. Herbert Stone this year at Marston Green. He said that he believed it was many years since the species was taken locally, though there used to be several localities for it, and he knew it used to be taken near to Marston Green about forty years ago. Mr. J. T. Fountain said that he had taken *C. elpenor* at Shirley. Mr. Wainwright also showed a nice series of *Criorhina asilica* taken at Trench Woods last May, when the species was common. By Mr. G. W. Wynn, the following Lepidoptera taken in Wyre Forest this year:—*Eupithecia venosata* (a new record), *Acronycta ligustri*, *Boarmia repandata* var. *conversaria*, *Phorodesma bajularia*, *Acronycta leporina*, *Orgyia gonostigma* (male), *Angerona prunaria* (a series), *Cymatophora or*, *Boarmia roboraria*, and *Hadena genistæ*; also *Triphana fimbria*, bred, from Sutton Park, including one in which the band of the hind wings was decidedly grey in colour, not black; also *Taniocampa populeti* from Rhayader, North Wales; and bred series of *Hadena glauca* from both Sutton and Cannock Chase, those from Sutton being darker than those from Cannock, contrary to experience of other species of Lepidoptera. By Mrs. Petley, a nice series of *Cucullia umbratica* from Wyre Forest. By Mr. R. G. B. Chase, a small collection of Lepidoptera made during a month spent at Tenby, including *Cleora lichenaria* and *Agrotis lucerneæ*. By Mr. P. W. Abbot, a series of *Thecla pruni* from near Peterborough,

and *Papilio machaon* from Wrexham Broad, Norfolk. By Mr. J. T. Fountain, *Scotosia vetulata* from Salford Priors.

August 17th.—Mr. R. C. Bradley in the chair. Exhibits:—By Mr. Wainwright (for Mr. C. A. E. Rodgers), a specimen of *Smerinthus tilia*, from Malvern, which entirely lacked the reddish tinges of the wings, and was entirely green, rich and dark in colour. By Mr. R. C. Bradley, *Formica exsecta* from Bournemouth, the known British locality, one male taken on May 10th; also a specimen of *Ponera contracta* from his garden at Sutton, a rare ant which he said was not hitherto known in the Midlands. By Mr. R. G. B. Chase, *Vanessa c-album* and *Triphæna ianthina*, both from Edgbaston. By M. A. H. Martineau, a piece of a gate-post with nests of *Anthophora furcata* and *Pemphredon lugubris*, and explained the manner of making them, &c.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—An Exhibition Meeting was held on Monday, Sept. 14th, under the presidency of Mr. S. J. Capper, F.L.S., and was decidedly successful, the number and variety of the exhibits being in excess of any previous meeting. Some of the more notable exhibits were as follows:—By the President, a drawer containing 300 varieties of *Arctia lubricipeda*, including vars. *eboraci* and *radiata* and many fine aberrations; and a similar drawer of *A. menthastri*, including a long series with brown upper wings. By Mr. B. H. Crabtree, a very long series of *Cænonympha davus* var. *rothliebii*, from Witherslack; three very light *Argynnis euphrosyne*, and two dark *A. selene*; and a drawer of Sesiidæ, including rows of *Sesia sphegiformis*, *S. musciformis*, *S. ichneumoniformis*, *S. chrysidiformis*, and *S. scoliiformis*. By Mr. Harold Milne, long series of *Erebina blandina* and *Cloantha solidaginis*, an extreme form of *Lycæna ægon* var. *corsica*, a magnificent *C. davus* having the ocelli very large and elongated (similar to a variety of *E. hyperanthus* recently figured), a fine *Eutheonia russula* with immaculate hind wings, a melanic *Macaria liturata*, and a very large *Abraxas grossulariata* deeply suffused with yellow. By Mr. Joseph Collins, a collection of moss insects, including fine series of *Carsia imbutata*, *Hydræcia petasitis*, and a melanic race of *Cymatophora duplaris*. By Mr. T. G. Mason, series of *Hydræcia nictitans* var. *paludis*, *Orgyia fascelina*, and a black var. of *C. duplaris*. By Mr. R. Tait, imagines and living larvæ of *Agrotis ashworthii*, a splendid var. of *Asphalia ridens* having the base and apex broadly light and the central fascia very dark, and a *Noctua* which is probably a variety of *Agrotis agathina*. By Mr. Prince, series of *Bombyx trifolii*, and two *Leucoma salicis* which have the outer margins of the fore wings suffused with smoky black. By Mr. H. Bickerton-Jones, series of *Leucania littoralis* and *Orgyia fascelina*, including two asymmetrical females, both having black blotches on the costa of the left upper wing; and a box of Geometers, including *Psodos trepidaria*, *Hyria auroraria*, *Asthena blomeri*, *Lobophora viretata*, and *P. lapidata*. By Mr. F. N. Pierce, vars. of *Polyommatus phleas*, and a curious malformation of *Strenia clathrata*. By Dr. J. Harold Bailey, a collection of Coleoptera from the banks of the Ribble, including *Bledius subterraneus* and *B. pallipes*, and *Telephorus paludosus*, which is new to Lancashire.—H. BICKERTON-JONES, *Hon. Sec.*; 180, Lodge Lane.

THE NONPAREIL ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—October 1st, 1896.—Exhibits:—By Mr. Samson, very fine series of *Arge galatea*, caught on Andover Downs; also specimens of *Charocampa elpenor* which were in faultless condition. By Mr. Martin, a nice specimen of *Acherontia atropos*, which he had bred from a larva found in the Isle of Wight. By Mr. Gurney, specimens of *Dianthæcia conspersa*, *Plusia chrysitis*, and *Cymatophora ridens*, the latter being of a very dark form. By Mr. Hockett, good series of *Polyommatus adonis*, both male and female, taken at Folkestone. By Mr. J. A. Clarke, who visited the Society towards the close of the evening, two specimens of *Nyssia lapponaria*, and three splendid varieties of *Abraxas grossulariata*, one showing the black mantle form, another being of the yellow mantle form, whilst the third was almost devoid of markings on the fore wings and quite so on the hind wings; also a very variable series of *Oporabia filigrammaria*. The result of the election of officers was as follows:—President, Mr. Thos. Jackson. Vice-President, Mr. Wm. Stevens. Curator, Mr. Harpur. Secretary, Mr. F. West. Treasurer, Mr. H. Blake. Reporting Secretary and Librarian, Mr. F. A. Newbery. Trustees, Mr. Gurney and Mr. Hockett. Committee, Messrs. Hockett, Gurney, Norman (E.), Cooper, Harpur (W.), Farmer, Butt, Lusby, Moore, Samson, and Norman (A.). Mr. Clarke was afterwards enrolled a member of the Society.—F. A. NEWBERY, *Reporting Secretary*.

RECENT LITERATURE.

'The Gypsy Moth (*Porthetria dispar*, Linn.): A Report of the Work of Destroying the Insect in the Commonwealth of Massachusetts; together with an Account of its History and Habits both in Massachusetts and Europe.' By Edward H. Forbush and Charles H. Fernald, A.M., Ph.D. 495 pp. Appendices and Index c; with 66 plates (some coloured), numerous illustrations in the text, and 5 maps. Published under the direction of the State Board of Agriculture by authority of the Legislature. Boston: Wright & Potter. 1896.

'Contributions towards a Monograph of the Aleurodidæ, a Family of Hemiptera-Homoptera.' By W. M. Maskell. 39 pp., 12 plates. Extract from 'Trans. New Zealand Institute,' vol. xxviii. 1896.

'Further Coccid Notes; with Descriptions of New Species, and Discussion of Questions of Interest.' By W. M. Marshall. 31 pp., 8 plates. Extract from 'Trans. New Zealand Institute,' vol. xxviii. 1896.

'Nineteenth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois for the years 1893 and 1894.' By S. A. Forbes. 206 pp., 13 plates. Springfield, Ill.: Ed. F. Hartman, State Printer. 1896.

'On the Mediterranean Flour Moth (*Ephestia kuehniella*, Zell.)' Appendix to above. By W. G. Johnson.

'New Mallophaga: 1. With Special Reference to a Collection made from Maritime Birds of the Bay of Monterey, California.' By Vernon L. Kellogg. 168 pp., 14 plates. Leland Stanford, Jun. University, Paulo Alto, California. 1896.

EXCHANGE.

Marked * are bred.

Duplicates.—Exotics, including Atlas. *Desiderata*.—English Lepidoptera.—*E. W. Lane*; 9, *Teesdale Street, Hackney Road, London*.

Duplicates.—*T. Pruni, Betulæ** *Desiderata*.—*Arion, Iris*; in good condition; black pins.—*Douglas H. Pearson*; *Chilwell, Notts*.

Duplicates.—*Nupta** full-grown larvæ of *Cossus*. *Desiderata*.—Pupæ and imagines, numerous.—*H. W. Bell-Marley*; 60, *Shaftesbury Road, Ravenscourt Park, London*.

Duplicates.—*Chrysitis** Black pins. *Desiderata*.—Ova or pupæ only of many *Bombyces* and *Geometræ*.—*Ernest Cornell*; 16, *Queen's Grove Road, Chingford, Essex*.

Duplicates.—*Sponsa*. *Desiderata*.—*H. Comma, Linea, Littoralis, Connexa, Furuncula, Interjecta, Ypsilon, Diffinis, Chamomillæ, Arbuti, V-Aureum, Clorana*.—*Rev. W. Claxton*; *Sunnyside, Woolston, Southampton*.

Duplicates.—*Prunaria** (exceptionally fine banded forms), *Io**, *Pudibunda** &c. *Desiderata*.—Local *Noctuæ*; and numerous ova, larvæ, and pupæ.—*J. G. Goddard*; *Erith, Kent*.

Duplicates.—Ova of *B. Trifolii*. *Desiderata*.—Set specimens of British bees; or microscopical slides showing structure of *Apis mellifica*.—*W. Buckley*; 17, *Upper Moss Lane, Manchester*.

Duplicates.—*Coleoptera*: *Callidium variabile, Nacerdes melanura, Chrysomela gœttingensis, and Lamina*. *Desiderata*.—*Chrysomela cerealis, graminis, marginata, sanguinolenta*; and many other rare and local *Coleoptera* and *Lepidoptera*.—*W. E. Butler*; *Hayling House, Reading*.

Duplicates.—*Litura, Macilenta, Oxyacanthæ, Vetusta, Exoleta, Fuliginosa, Carpini, Polyodon, Aurantiaria* (few males and females), *Brumata, Piniperda, Cardamines, Atalanta*.—*John Robly*; *Muirland Cottages, Port Elphinstone, Inverurie*.

Duplicates.—*Edusa, Adippe, Polychloros, Lineola, Plantaginis, Villica, Carpini, Lunaria, Zonaria* (female), *Citraria, Falcula, Munda, Gilvago*. *Desiderata*.—*Aglais, Davus, Ligniperda, Senex, T. Cratægi*, and very many others.—*Bernard S. Harwood*; *Brooklyn Villas, Colchester*.

Duplicates.—Pupæ of *Pavonia* (*Carpini*) and *Curtula*. *Desiderata*.—Ova and pupæ of *S. Ligustri, Elpenor, Ocellatus, Limacodes, Monacha, Cratægi, Callunæ, Dromedarius, Ziczac, Pigra, Flavicornis, Venosata*, and many other common species.—*G. R. Garland*; 94, *Sedgwick Road, Leyton, Essex*.

Duplicates.—Pupæ of *Prasinana, Coryli, Trilinearia, and Adustata*; imagines of *Jacobææ**, *Potatoria**, *Coryli**, *Persicariæ**, *Pistacina, Umbratica, and Betularia**. *Desiderata*.—*Paniscus, Lineola, Ochracea, Syringaria, Lunaria, Illustraria*, and many others.—*H. Douglas Stockwell*; 2, *Albert Road, Dover*.

Duplicates.—*Gilvago, Promissa, Sponsa, Ophiogramma* (few), *Meliloti, Cinxia** (British), *Rhomboidæa* (few), *Miniosa*; *Exotic butterflies, Papilios, &c.* *Desiderata*.—*Saponariæ, Nigrocincta, Cassinea, Rubiginea, Carmelita, Obelisca, Nigra, Exulans, Muscerda, Fluctuosa*; preserved larvæ; *Exotic butterflies*.—*W. Dannatt*; *Ivy Dene, Westcombe Park, S.E.*

Duplicates.—*Citrago, Russata** (fine Cornish forms), *Propugnata, Badiata, Munitata, Loewii*, Spilodactyla*, Turionana*, Edusa*, Adonis, Fibrosa vars., Galatea, Gracilis, Typhæ*, Rubricosa*. *Desiderata*.—Very numerous; *Diurni, Bombyces, and Noctuæ*, to extend.—*W. G. Sheldon*; *Kirkstyles, Havelock Road, Croydon*.

Duplicates.—*Gothica** (from *Gothacina* female), *S. Populi*, Ocellatus*, Flavicornis*, Cerago*, Caia*, Neustria*, B. Quercus*, Festuca*, Amataria, Popularis, Pilosaria, Myrtilli, Pyraliata, Pinastri*. *Desiderata*.—*Thymiarina, Candidata, Cambricaria, Clathrata, Emutaria, Imitaria, Rhizolitha, Lithoriza, Verbasci, Tincta, Iota, Pulehrina* (to renew), *Aurago*.—*J. Arkle*; 2, *George Street, Chester*.

Duplicates.—Mostly *S. French*: *Podalirius, Sinapis, Cleopatra* (female), *Melanopa, Provincialis, Cinxia, Galatea, Convolvuli, Lavandulæ, Rhadamanthus, Pyri, Plumistaria*, and many others. *Desiderata*.—*Rhopalocera* of the world; *Macros* of Europe; series of *B. Quercus*, its vars. and larvæ. Should be glad to exchange with lepidopterists abroad, especially in Russia, Greece, and America.—*J. C. Warburg*; 8, *Porchester Terrace, Hyde Park, W.*

Duplicates.—*A. Atmoriella* (n. s.), *S. Pedella, Lafauryana*, Extersaria**. *Desiderata*.—Several local and rare species, especially *Semibrunnea, Umbrana, Myellus, Communana, Semirufa, Marginepunctella, Audoninana, M. Caledoniella, Granulosella, Palustrella, Obscurella, Junctella, Imperialella, G. Populella, Fagivora, and Viciniella*.—*E. A. Atmore*; *King's Lynn, Norfolk*.

Duplicates.—Minos (Welsh), Carpini* and pupæ, Russula (males), Flavicornis, Littoralis, Adusta, Rubricosa, Brunnea, Iota, Rufina, Selene, Artemis, Io,* *Ægon*. *Desiderata*.—Cracæ, Pastinum, Bractea, Orichalcea, Notha, Peltigera, Chamomillæ, Lychnitis, Semibrunnea, Atriplicis, Empyrea, Dysodea, Cæsia, Ochroleuca, Fulvago, Xerampelina, Leucographa, &c.—*E. W. H. Blagg; Greenhill, Cheadle, Staffordshire*.

Duplicates.—Conigera, Litura, Cucubali, Macilenta, Gemina, Variata, Festuæ, Suffumata, Lota, Strigillaria, Dahlii, Fuscantaria* (3), Cembra, Pinoverana, Bertramii, Coniferana, Trigonodactylus, Bouchardiana, Bipunctidactylus, Viburnana, Icterana, Hyrciniana, Stramineana, Hohenwartiana, Octomaculana, Angustana, Baumanniana. *Desiderata*.—Numerous; including many common species for renewal.—*A. M. Stewart; Park View, Kilbarchan, N.B.*

Duplicates.—Ova of Alniaria; pupæ of Strataria. *Desiderata*.—Imagines of Typhon (Davus), Exulans, Præcox; and ova or pupæ of Porcellus, Elpenor, Asellus, Monacha, Gonostigma, P. Populi, Trepida, Anachoreta, Ridens, Orion, Leporina, Strigosa, Alni, A. Ligustri, Auricoma, Hispidus, Albicolon, Opima, Populeti, Scrophulariæ, Lychnitis, Nubeculosa, Dolobriaria, Erosaria, Zonaria, Consortaria, Consonaria. Only fine and medium set insects, with locality, accepted; black pins.—*G. R. Garland; 94, Sedgwick Road, Leyton, Essex*.

Duplicates.—B. Rubi larvæ, Quercus,* Neustria,* Caja,* Meticulosa, Ripæ, and Grossulariata. *Desiderata*.—Numerous.—*J. T. Hyde; The Grove, Portland*.

Duplicates.—Monacha* (dark varieties), Atalanta,* Io,* Tiliæ,* Dispar,* Autumnaria,* Neustria,* Bucephala,* Instabilis,* Stabilis,* Illunaria,* Black pins. *Desiderata*.—Butterflies, numerous. Black pins. To renew series.—*F. J. Rasell; 67, St. James's End, Northampton*.

Duplicates.—Preserved and stuffed larvæ: P. Brassicæ, Rapæ, V. Atalanta, Urticæ, S. Populi, Filipendulæ, Jacobææ, Caja, Fuliginosa, Salicis, Dispar, Monacha, Fascelina, Lanestris, Neustria, B. Rubi, B. Quercus, Trifolii, Potatoria, Carpini, Pilosaria, Zonaria, Grossulariata, Defoliaria, Progemmaria, Didymata, Bucephala, Cæruleocephala, Littoralis, M. Brassicæ, Præcox, Xanthographa, Lucipara, Pisi, Chrysitis, Iota, Psi, Cursoria, Trapezina. *Desiderata*.—Numerous.—*C. C. Couldwell; 1, Park Avenue, Cane Street, Hull*.

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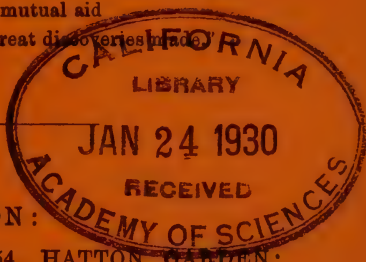
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DECEMBER, 1896.

[No. 403.]

ABERRATIONS OF *ZYGÆNA TRIFOLII*.



FIG. 1.



FIG. 2.

THE two insects figured above were taken by myself in West Sussex.

Fig. 1.—This specimen of *Zygæna trifolii* has only four spots on each wing, and is the only example of this form of the species that I have ever seen.

Fig. 2 represents a variety of *Z. trifolii* which I have already referred to in this Journal as reminding me of *Z. pilosellæ* (Entom. xxviii. p. 215). Three examples, all pretty much of this form, were taken. I may add that *Z. meliloti* and *Z. lonicæræ* also exhibit this *pilosellæ*-like form of aberration, as may be seen by referring to Mr. Barrett's book (vol. ii. pl. 59).

W. M. CHRISTY.

November, 1896.

NOTES ON THE EARLIER STAGES OF THE SECOND BROOD OF *Polyommatus (Lycaena) argiolus*.*

BY ROBERT ADKIN, F.E.S.

WHILE staying at Eastbourne in August last I chanced to come upon a female *Polyommatus argiolus* in the act of depositing ova on heads of flower-buds of ivy; subsequent search revealed eggs in considerable numbers, and later on the resultant larvæ. I was thus enabled to follow the life-history of the autumn brood under absolutely natural conditions, from the laying of the egg till the pupal stage was reached, of which the following is a brief account:—

At the time when the butterflies of the second brood are on the wing, the flower-buds of the ivy are still young and form compact heads. The butterfly, having selected one of these heads, settles upon its top, closes her wings over her back, and, bending her abdomen down and round underneath the buds, affixes an egg to the under side of one of the slender single bud-stalks. In about a week the eggs hatch. The young larva, which in colour matches the buds very closely, rests on the bud-stalk with its anterior segments, which completely cover its head, pressed closely against the bud, and looks so exactly like a slight swelling of the upper part of the stalk as to make detection a matter of great difficulty, even with the aid of a fairly powerful lens. Throughout its life the larva is very sluggish in its habits, seldom leaving the head of buds on which it is hatched, so long as sufficient food remains for its nourishment, or occasionally when about to change its skin. It appears to feed only at night, and its manner of feeding, which is the same throughout its life, is to eat a round hole through the outer shell of a bud, and pressing its head forward through it to clear out the soft inside of the bud. In from four to six weeks it is full-fed; it then quits the buds, and attaches itself by slender silken threads to a leaf, and in a few days becomes a pupa, in which state it passes the winter. Although there is an amount of recorded evidence that the larva will take other foods, the peculiar resting habit and manner of attacking the flower-buds suggest very strongly that the only natural pabulum of the later brood is the ivy flower-buds, and the early brood would find the flower-buds and young green berries of the holly similarly suitable to their habits.

* Abstract of a paper read before the South London Entomological and Natural History Society, Nov. 12th, 1896.

THE SENSES OF INSECTS.

BY J. ARKLE.

THE criticisms from home and abroad, hostile and friendly, scientific and lay, which have been made upon my remarks under this head (Entom. xxvii. 336; xxviii. 243) have been a source of much personal gratification. The subject has even been reviewed by Mr. Tutt (Entom. Record, vii. 178). If this acknowledgment should appear to come somewhat tardily, I would say I have been waiting for additional light on the views and experience of some of my critics. Like Mr. Marshall's "anomaly," however, I have still to wait.

I am by no means the author of the objection to hearing in insects. Among scientific men, Linné and Bonnet thought insects had no hearing. It would scarcely be fair to retort that I seek cover under fossil authorities. For I have been rather surprised to find that some of the experiences quoted by present-day writers in support of hearing in insects are decidedly ancient rather than modern. The word "hearing" implies a sensitiveness to sounds in general. It is a human conception, and defines a sense common to man and other vertebrates. Whenever I look for evidence of this sense in insects, I look in vain. That is my position with reference to all insects I know.

Mr. Marshall observes (Entom. xxix. 42):—"I should consider that the difference between the sense of hearing and that of touch is only one of degree and not of kind." I cannot agree with him. I believe hearing and touch are distinct senses. We no more use the organs of touch for the purpose of hearing than we use for the purpose of touch the internal ear.

Let us travel a little with the theory of concussion or vibration as applied to insects—even though that theory, as yet, be but a parasite on what is admittedly an inexact science. It is something more than the concussion or vibration set up by a blow on a tree. Let us seek for something like a definition; see if there can be room for such a theory; leave it for the present as a thing we know little about; and seek consolation in the thought that if we knew everything we should think far too much of ourselves. By way of definition here is what Kirby and Spence say:—"The hearing in insects may be something related to hearing as *we* understand it. Antennæ, for example, may collect notices from the atmosphere, receive pulses or vibrations and communicate them to the sensorium, which, though not precisely to be called hearing, may answer the same purpose" ('Introduction to Entomology,' vol. iv. p. 240). And here is scope even from Mr. Marshall:—"There is little doubt that such auditory powers as are possessed by insects are of a very different character from those possessed by man, as they

are not nearly so highly specialised or differentiated, and it is extremely probable that they are in many instances nearly allied to, or combined with, the faculties of touch."

To claim the sense of *hearing* for insects after admissions like these is indefensible. Let us look a little at the anatomy of an insect. It is enclosed in a kind of shell. We wear our skeleton internally; the insect wears its externally. Protection against injury is not the only thing aimed at under this arrangement. Take a living *Aeschna grandis* by the wings and turn it upside down. You will see, with the aid of a lens, one of the most delicate mechanisms, suggesting respiration and circulation, close to the thorax, and exposed to injury every time the fly settles on a hedge. The dragonfly wears his shell dorsally and laterally—just where there seems least risk of injury. And here and there, as in other insects, this shell is studded with minute hairs, which may also "collect notices from the atmosphere, pulses and vibrations." To sum up: there may be a great deal in connection with this horny shell not dreamt of in our philosophy.

He who would wander in the paths of atrophy and development must start with a stock of faith. I do not point to this as a fault, but a fact. For humanity can hardly stir without faith. Leaving the era before the common cell of protoplasm as prehistoric, we arrive at a general, if momentary, agreement upon the chronological origin of insects and vertebrates. The insects came first. And so "our cerebral hemispheres are but modifications of the supra-oesophageal ganglia of a scorpion, while our eyes and nose are the direct descendants of its eyes and olfactory organs." True, this explanation "differs from all others," but that is as nothing—and it is present-day. But at this the layman definitely revolts. Neither will he have it that there is a "residual reptilian influence" in the practice of hissing bad plays; or that when we yawn "we are trying to use gills which have been closed nobody knows how long." He asserts, "If the unscientific person read much of this sort of thing without the proper correctives, and looked at the freaks and perversities of evolution without looking still more at its great sanities, he might believe that Nature made her arrangements chiefly for some time ago, and that her later children have to put up accordingly with a mortifyingly large proportion of second-hand and misfitting instincts." Personally, by preference, and without fear or favour, my faith lies in the story of Creation. Nothing there must be upset, save on the strictest lines of reciprocity. *Quid pro quo!*

To turn again upon the additional sense in insects is like slaying the slain. Mr. Marshall asks (*ante*, p. 48), "Many insects, such as bees, ants, &c., possess a definite and fixed abode, from which they are in the habit of wandering, sometimes for con-

siderable distances, in search of food. Now, if these insects have no sense of direction whatever, how can they find their way back as accurately as they do?" They find their way by the use of landmarks! Disturb a bee, and it will circle round and round like a carrier-pigeon. Here is a hive only a few hundred yards from the sea. Twenty bees are liberated on the shore, and not one of them returns! Another lot set free on a lawn two hundred yards away—another unaccustomed place—are equally unable to find the hive! Forty ants feeding on some honey placed on a square of glass close to their nest are removed fifty yards off. They all lose themselves! Now, I pause to consider what would be the result were this a lay instead of a scientific explanation. One of my critics, I fear, would betake himself to the seat of the scornful; another to bone-picking—rest and refreshment? But the explanation is that of Sir John Lubbock, of Mr. Romanes, of Mons. Fabre. The experiments I very briefly quote will be found described at length, with others, in 'The Senses of Animals' (Sir J. Lubbock), chapter xiii.

Chester, November 2nd, 1896.

ON THE PREPONDERATING INFLUENCE OF THE ORGANIC OVER THE PHYSICAL ENVIRONMENT IN DETERMINING THE VERTICAL DISTRIBUTION OF THE LEPIDOPTERA.

By W. HARCOURT-BATH.

IN endeavouring to elucidate the various problems connected with the vertical distribution of the Lepidoptera in the different and diverse mountain systems in Europe, a great many factors have to be taken by the student into consideration.

The hypothesis of the glacial epoch and the subsequent amelioration of the climate supply us with the means of gauging the indirect action of the physical conditions which have operated to produce the present result. But a little further insight into the subject at the same time will enable us also to estimate and appreciate the preponderating influence exerted by the organic over the physical environment.

Although many hold that the mere effect of the climatal conditions (especially the temperature and precipitation) are by themselves the principal factors in deciding the vertical distribution of the great majority of species, I am perfectly convinced personally that such is not the case, but that they do in point of fact play quite a subordinate part in the determination, although they may be in a good many instances the indirect cause thereof.

Many examples could be given in support of this contention. I will confine myself to a few.

Numerous species of alpine plants which only live at great altitudes upon the mountains in their native habitat can be made without any difficulty whatever to flourish in gardens even down to the sea-level. Witness, for instance, the many kinds of alpine saxifrages and gentians, &c., which are in cultivation. The various species of pines and fir trees which constitute the typical arboreal conditions of the sub-alpine zone in the mountains, and of the sub-arctic region of the horizontal isotherms, can in like manner be successfully grown in places where the temperature is considerably higher. There is no reason therefore whatever to conclude that their distribution either vertically or horizontally is directly due to the climatal conditions.

The same thing precisely holds good with regard to the Lepidoptera, which are subject to the same general laws as the plants which provide their pabula.

There are, on the other hand, some powerful reasons for supposing that many of the species of plants and animals which are now confined to high altitudes upon the mountains, or exist only in the high latitudes of the north, owe their survival almost exclusively to the direct influence of the organic environment. The particular organic competition with which they would have to contend at lower elevations may be entirely wanting at the higher ones. In the case of insects, their natural enemies, birds, bats, moles, shrews, lizards, and frogs, are usually very scarce in all the higher zones.

In many parts of the Alps, where the mountaineers have ruthlessly destroyed many of the more extensive forests of deciduous trees, the conifers have taken their place, in some instances springing up spontaneously, and at present successfully maintaining their ground against the oaks and the beeches. The inference to be drawn from this fact is that the conifers are capable of flourishing at lower levels than they at present occupy, quite as well as at the higher ones, provided they are precluded the possibility of competition from the more vigorous oaks and beeches of the lower elevations. Whether the pines and the firs will successfully prevent the encroachment of the latter in the spaces which have been cleared for them, for several centuries to come, is, I should venture to say, extremely doubtful. On the other hand, the conifers, with their needle-like foliage presenting a minimum of surface to the frost, alone survive at the higher altitudes where the deciduous trees would, by reason of their larger leaves, soon perish.

The direct influence of the climatal conditions seems to act more powerfully in curtailing the upper rather than the lower limits of species. Many species of butterflies and moths thus seem very sensitive to cold, especially in the pupa-state, as is

well known to those who rear exotic forms in this country. This is possibly the principal reason why *Acherontia atropos* and several other species of Sphingidæ do not occur permanently more plentifully in the British Isles than is the case, although certain plants which the larvæ are known to feed upon are found in sufficient abundance.

Deficiency of moisture seems in a similar way to circumscribe the distribution of certain species in other countries. These are also apparently instances of the direct influence of the physical conditions.

The distribution of the Lepidoptera both vertically and horizontally is not by any means always co-extensive with that of their pabula. In some instances it may be more extensive than that of their usual food-plant, when they select a closely-allied species in its stead; but in the majority of cases the plant possesses the widest distribution of the two. In the latter the struggle for existence with their natural enemies proves too great for the insects, notwithstanding the abundance of their food supply.

We have good grounds for supposing that many species of animals and plants formerly existed in situations and at elevations where the climatal conditions were very different from those which they occupy at the present day. There are numerous examples of this to be found in the Alps, the correct causes of which we know. The chamois, for instance, which formerly frequented the pine forests, are now seldom seen there, except in the winter time, having been forced to flee upwards before their chief enemy, man. The bear, the lynx, and the ibex have similarly had to seek refuge among the higher and more inaccessible peaks. Many insects are also now found less commonly than formerly at the lower elevations, owing to the extension of cultivation. Numerous other similar instances might be adduced all in support of the superior power of the organic environment.

From the discontinuity in the present distribution of many genera and species of fauna and flora, their former more extensive area which they occupied may be estimated. Take, for instance, the Pyrenean desman or water mole (*Mygale pyrenaica*), which possesses its nearest relative in the steppes of South Russia. Then we have two species of butterflies in Europe, namely, *Zegris eupheme*, which occurs in Andalusia, South Russia, and Asia Minor; and also *Satyrus hippolyte*, which is likewise found in the Iberian Peninsula, and again in the South of Russia, but not in any intermediate locality. All of these must once have possessed a continuous distribution in order to account for their present dispersion.

The genus *Ænis*, or its immediate stirps, undoubtedly possessed in former times an almost complete cosmopolite distribu-

tion both geographically and vertically, if we thus can correctly interpret the fact that the most closely allied representatives of this arctic and alpine group are elsewhere (in the southern hemisphere) to be found in the alps of New Zealand (*Argyrophenga*), and in the Chilian Andes (*Argyrop*); while the well-known genus *Erebia* was once in an almost similar position, judging from the fact that it possesses very near representatives in the Southern Andes of South America, as well as in the highlands of South Africa, several genera of which were indeed formerly included in that of *Erebia*. If, however, in the latter case the genus may not have been so completely cosmopolite, I do not see that the contention cannot hold good with regard to the former; for if, as Darwin suggested, the alpine fauna of the American Andes was derived from the regions to the north during the glacial epoch by means of the elevated mountain chain crossing the equator, I fail to perceive how it can account for the occurrence in a similar manner, in the isolated archipelago of New Zealand, of the genus *Argyrophenga*, which is so closely allied to *Enis* of our northern hemisphere. In this connection, I may here remark that the marsupial mammals which are now so abundant and characteristic of the Antipodes were, during Miocene times, almost equally as plentiful in Europe, including the British Isles.

Another important item in support of the hypothesis that the organic conditions exert a paramount influence upon their distribution is to be found in the fact that many species of plants and animals occur in certain zones upon some mountains which do not correspond with their occurrence in other zones further north. A typical instance of this is to be found in the Austral species *Lampides bœtica*, which in the region of the Alps only inhabits the lower valleys of the mountains, but which, both in the Pyrenees and the Himalayas, occurs at greater elevations both comparatively and relatively, having been found in the former range at the altitude of 8000 ft. under circumstances which conclusively prove that it could not have been a mere immigrant there. Conversely, a few instances could be given to show that certain species do not occur at such corresponding high zones as is the case further north. In certain instances also, species are known to be confined to intermediate zones in comparison to those they occupy in other mountain chains, or even in different parts of the same range. The general rule is, however, the other way, and their vertical distribution corresponds with remarkable uniformity in relation to both the accompanying phyto-geographical and the climatological conditions of regions and mountain ranges widely separated.

This remarkable regularity, however, does not at all detract from the hypothesis that it is the organic environment which

carries the greatest weight, for when brought into competition with the physical the latter has simply to succumb to it. It is only when the former influence is exerted in a negative manner that the effects arising from the physical conditions can survive. We have thus sound reasons for supposing that the insects are confined to particular zones principally by means of the organic barriers which prevail upon either side of them.

It may be true to a considerable extent that the physical conditions operating upon the organism during the course of many generations do produce effects and modify peculiarities favourable to their survival, but only through natural selection, for if these climatic modifications possessed traits or developed correlative characters which were antagonistic to their well-being, they could not possibly retain their place successfully in the great struggle for existence.

Birmingham, Oct. 20th, 1896.

THE ABERRATIONS OF SECONDARY SEXUAL CHARACTERS IN PAPILIONIDÆ.

BY JOHN WATSON.

IN the 'Entomologist,' vol. xxviii. p. 166 (1895), I drew attention to two aberrations of secondary sexual characters in male Rhopalocera, one being an androconia-bearing male of *Papilio paris*, L.; the other being a male of *Eriocolias fieldii*, Mén., without the characteristic congested scale-patch on hind wings.

A few weeks since, in going over the fine collection of my friend Mr. Paul Schill, I came across another male of *P. paris*, identical in all respects to mine; and later on again, in a small collection I received from Shillong, in Assam, I found another male with this character faintly showing, but at the same time quite appreciable on examination with a lens, and thus being intermediate between typical *P. paris* and the androconius aberration. This brings forcibly to my mind the need for fixing an identity to these phylogenetically valuable evidences of generic and specific affinity.

In regard to *P. paris*, on microscopical examination of a small portion of scales taken from the androconius nervule, it is clearly seen how the long filamentous scales have been derived from the ordinary dark brown dentate ones; for I have on one slide scales showing the whole range of variation from normal scale to androconia. The plan of the development from the ordinary squamose quadridentate scale appears to be this:—Coincidental to the lengthening of the scale, usually (though not

always) the two centre teeth merge into one; in scales which have a length of six to eight times as long as broad the two lateral points have disappeared, leaving a long scale thicker at two-thirds than one-third from the base; sometimes the two lateral teeth disappear the first, and leave a bilobed scale, which persists as such up to scales having a length of about ten times as long as broad, when the two lobes merge; the pedicular point of attachment becoming later on merged into the lengthened scale, so that the demarcation of scale and pedicle is not apparent; the whole then becomes a long brittle filament, with a slightly punctured surface, and ending in an almost imperceptible point,—typical androconia. One point in regard to these androconia of *P. paris* is, that apparently they are nearer in structure as to build and stoutness to *P. bianor*, Cram., than to *P. ganesa*, Doubl., which latter species it most nearly resembles in outward appearance.

I sent the type-specimen for examination to the Hon. Walter Rothschild, who considers it interesting as showing that too much faith must not be placed upon the presence or absence of the secondary sexual characters for defining genera, and with which I now agree; for (1st) while an individual of a species may occur as an aberration possessing a character, sexual or otherwise, which is not found in its genus, and the genus would still be held as a good one; yet (2nd) if two or more individuals of a certain species of a genus, occurring as aberrations and possessing a character showing transitions from the type of their genus towards the type of an allied genus; or again (3rd) a specimen of a genus I will term A occurring as an aberration possesses a character well developed, found normally in an allied genus B, and an individual of genus B, also found as an aberration, does not have this distinctive character of its genus; it follows that though the occurrence of the first type of aberration which I designate “adventitious” would not affect the stability of the genus to which it belonged, the occurrence of cases of either the second type (transitional) or the third type (overlapping) would certainly merge together the two genera in which these types of aberration appeared, though it would be advisable, I think, to retain the newer genus as a subgenus if possible.

In his ‘Revision of Papilios of the Eastern Hemisphere exclusive of Africa,’ Mr. Rothschild, speaking of *Papilio bianor*, Cram., p. 379, says:—“I have specimens in which all the stripes are separated from one another; and such a variability is not to be wondered at, as we find the cottony stripes variable in size and number in all the species where they appear; in some insects, for example in *P. crino*, Fab., and *P. montrouzieri*, Bois., these sexual marks vary even to such an extent that certain individuals have the stripes developed, while others have no

stripes at all"; and I now find this certainly is the case with *P. paris*; thus his group xxiii. (*bianor* group) will, if no other character is found sufficient to separate them, be merged along with group xxiv. (*paris* group), being connected by the aberration I am about to describe.

Papilio paris, L., male ab. *schilli*.—Male. With a streak of filamentous scales on the first median nervule of upper surface of fore wings. Hab. Assam. Two specimens. In my own and the collection of Mr. Paul Schill.

Transitional form to the ab. *schilli*.—With the cottony streak very faint. Hab. Shillong, Assam. One specimen. In coll. Watson.

It is by no means unlikely that the ab. *schilli* is to be found in other collections, where it has been unnoticed; and here is my contention, that by not having this aberration distinguished a most interesting point may be kept in the background. I am by no means one who favours the wholesale creation of species, and on characters which will often not bear investigation, as is often done, particularly on the Continent, and from a pecuniary point; but there are two ends to every stick, and I think the most consistent plan is to pursue the medium line of moderation, and the most thorough exposition of this middle course is to be found in the plan of classification laid down and followed by the Hon. Walter Rothschild in his 'Revision of Papilios' (*loc. cit.*), which, in reducing a host of so-called species to the rank of subspecies (vars.), is the most drastic of which I know, and is at the same time the most detailed in the classification of every known form, variety, or aberration, according to its form, season, locality, &c.

The genus *Eriocolias* (Watson, Entom. xxviii. 166) will now take rank as a subgenus, as I believe the aberrations of *E. fieldii* and *Colias erate* I am about to describe will bridge over and connect the two sections.

Colias (subgenus *Eriocolias*) *fieldii*, Mén., male ab. *moorei*. Male. Without the congested scale-patch on costa of upper surface of hind wings as normally found in individuals of this species. Hab. N.W. Himalaya. One specimen. In coll. Watson.

I have named this aberration after Mr. Frederick Moore. I have examined the twenty-eight males of *E. fieldii* in my collection, and there is no variation in the size of the scale-spot, except one example, other than a proportionate size to the insect; the one exception is not less than two-thirds average size, and I have seen and examined at least a hundred and fifty other specimens.

The entire opposite to this type of aberration is:—

Colias erate, Esp., male ab. *erioptera*. Male. With a congested scale-patch as normally found on costa of specimens of subgenus

Eriocolias. Two specimens. In collections of Mr. F. Moore and my own. Mr. Moore's specimen from Punkabaree, 1500 ft., Eastern Himalayas; my specimen from Corea.

This ab. of *C. erate* and the one of *E. fieldii* together form an instance of the third type of aberration or *overlapping*; the male ab. *schilli* of *P. paris* is a case of the second or *transitional*; and as an instance of the first or *adventitious* aberration (which is not, however, referable to secondary sexual character), I may mention the type-specimen of *Calinaga sudassana* (Melv. Trans. Ent. Soc. 1893, pl. 8). On closely examining the lozenge- or spindle-shaped spot (beautifully shown on the plate) on the costal nervure of hind wings, and which only the type-specimen shows, it is seen to be a split in the nervure at a certain point, on both hind wings and at the same place, where the nervure forks, and, having diverged about one-fourth of an inch, the two separate limbs approach, anastomose, and continue as the costal nervure. It is here interesting to note that a male of *C. buddha* in my collection has, at about the same position on the costal nervure of hind wings, on one side only however, a small short spur or veinlet given off from the costal to the costal edge of the wing. Mr. Hastings Dent's specimen of *C. sudassana* does not show the split, nor does the third specimen of this species in the Hon. Walter Rothschild's collection. This aberration of *sudassana* may be classed along with monstrous aberrations, but it may, along with the male of *C. buddha* mentioned, have a morphological significance as yet not understood.

SILK-PRODUCING LEPIDOPTERA.

BY ALFRED WAILLY.

(Continued from p. 279.)

African Species.

The African silk-producing Bombyces, excepting a few, are yet unknown as silk-producers; I can therefore only give the names of some species:—In Sierra Leone, *Saturnia alenda* and *S. phædusa*, Drury. In Natal, *Actias mimosæ*. In Senegal there is a species with a closed cocoon, *Attacus faidherbia*, which must then be an *Antheræa*, and it may be the species otherwise known as *Bombyx bauhinæ*.

The wild silkworms of Madagascar are better known, thanks to the Rev. P. Camboué, who has written numerous and interesting reports on this subject, which have been published in the 'Bulletin' of the Société Nationale d'Acclimatation de France. I shall therefore reproduce an article from the 'Bulletin' of June, 1885, by the Rev. P. Camboué.

BOROCERA MADAGASCARIENSIS, Boisduval. A species which the Malgaches call Bibindandy, which means silkworm, from which they obtain silk used in the manufacture of their magnificent stuffs called Lamba-landy. The cocoon, of a greyish colour, is about 0.05 m. in length by 0.03 m. in its broadest diameter, when produced by the female insect. The cocoon of the male is but 0.03 m. in length by 0.015 m. in its largest diameter. The moths emerge about thirty days after the formation of the chrysalis. The Bibindandy larva is very polyphagous, but the Malgaches rear it in preference on the *Cytisus cajanus* and on the *Tapia edulis*; among other trees the weeping willow is given. The Rev. P. Camboué also says he found on the coast cocoons of Bibindandy on the orange tree, on a species of *Terminalia* called in French "*Badamier*," and on the *Barringtonia speciosa*. On the western coast many are found on the "palétuviers" or mangrove, and other trees growing on the sea-shore. The Bibindandy can live on the hills in the interior of the island, where there are only three or four degrees centigrade of heat. This is the most important of the wild silkworms of Madagascar.

BIBINDANDY DYNAMBOA (dog silkworm) and **BIBINDANDY MADI-NIKA** (small silkworm) are two species of *Borocera* allied to *B. madagascariensis*.

GONOMETA POSTICA, Walker. An important South African species, which feeds on *Mimosa caffia*. The female cocoon is considerably larger than that of the male, and the insect has a striking analogy with the *Borocera*. It is described and figured in the report for the years 1887 and 1888, presented to the Lyons Chamber of Commerce by the "Commission administrative," Mr. Roberts, of Uitenhage, having sent, through the medium of the Vice-Consul of France at Port Elizabeth, for the laboratory of the Lyons Chamber of Commerce, specimens of cocoons and moths, and all useful information respecting this species. According to the notes of Mr. Roberts, the moths of *G. postica* emerge in September, and the larvæ arrive at maturity about the end of December and commencement of January, and then form their cocoons, the pupæ remaining eight months in the cocoons before the moths emerge. During this long interval most of the pupæ are destroyed by a dipterous parasite, hardly a fifth of the live cocoons remaining for the reproduction of the species. Fortunately another parasite, one of the Hymenoptera, feeds in its turn on the terrible Dipteran, and thus limits its multiplication.

SATURNIA SURUKA, Boisduval, *Caligula suruka*. A large and beautiful species. The larva attains a length of ten centimeters, and forms a double net-work cocoon of a yellowish tint, about six centimeters in length, and three centimeters in its widest diameter. The larva, which is polyphagous, lives well on *Nerium oleander*. When full grown it is green, with greenish-

black spots, and thorny tubercles of a rosy tint. The perfect insect emerges about thirty days after the formation of the cocoon.

The Rev. P. Camboué has observed on the eastern coast, at Tamatave, another species of *Saturnia*, allied, to a certain extent, to *S. suruka*. The larva, a false Geometer, is beautifully black, ornamented on its segments with thorny projections, yellow on the last eight segments and pink on the first. The body is covered with spots of the same colour as the tubercles. The spiracles are black bordered with yellow; the claspers of a fine, shining black. It reaches nine centimeters in length, and is twelve millimeters in its widest diameter. It is polyphagous, and lives well on oleander. The cocoon is smaller and of a darker colour than that of *S. suruka*.

There are in South Africa several species of large Bombycidæ, six of which bear the following names:—*Antheræa menippe*, *A. tyrrhea*, *A. cytheræa* (*dione*), *Gyanisa isis*, *Bunæa caffraria*, and *Cirina forda*. The appearance of the moths of these species would certainly lead any entomologist, unacquainted with the first stages of the insects, to think that the first three, bearing the generic name of *Antheræa*, form closed cocoons like the other known species of *Antheræa*, and also that *Gyanisa* or *Saturnia isis* forms an open cocoon like *Saturnia pyri* or some other *Saturnia* or *Attacus*, but it is nothing of the sort. The larvæ of these species, and also that of *Bunæa caffraria*, burrow into the ground without forming any cocoon or shell of any sort. Another peculiarity is that the bare pupæ of these species resemble each other so much that it is difficult to distinguish them from one another. These five species have been bred during several years by two of my correspondents, and I have received pupæ of them from 1886 up to the present year. These pupæ are several months before producing the perfect insect, and they can easily pass the tropics without hatching during the voyage. I have now learnt by experience that, as a rule, pupæ of Bombycidæ from temperate climates can make long voyages without hatching, even under the influence of intense tropical heats; whilst tropical species often hatch two or three weeks after they have left their native countries, even if the heat becomes much less intense. In general, most species seem to have a tendency to hatch at the time fixed by nature in their native country, unless the temperature should be too cold.

In the spring of the year 1886 I received mixed chrysalids of *G. isis*, *A. tyrrhea*, and *B. caffraria*, and the moths emerged as follows:—On July 1st, one male *isis*; August 23rd, one male and one female *isis*; September 3rd, one male *tyrrhea*; 12th, one male and two females; and on the 15th, one male. A pairing took place during the night of Sept. 14th and 15th. Up to Sept. 27th thirty moths had emerged. Next a *caffraria* moth

emerged on Sept. 29th, and three *tyrrhea* from the 1st to 3rd of October; afterwards a male on the 5th, and another on the 19th of the same month, and that was the last. The eggs obtained from the pairing of Sept. 14th and 15th began to hatch on Nov. 3rd, and as a matter of course their existence was of very short duration.

BOMBYX CYTHERÆA (DIONE). On May 8th, 1888, I received a few small branches of a shrub with thick leaves, growing in the environs of Grahamstown, Cape Colony. On these leaves were fixed large white and reddish brown eggs. They were *cytheræa* eggs, and their number was ninety-seven. Sent from Grahams-town on April 16th, they reached me after a voyage of twenty-two days only. The hatching of fifty-seven larvæ took place on the day the box arrived (which was May 8th) and on the following day. The forty remaining ova, which were fixed to the same leaf, all hatched on the morning of May 18th.

The names of the food-plants for this species, which were sent by my correspondent, were white heath, *Acacia mimosa*, and wild currant, plants which I could not get. In a letter received much later on, I was informed that the larvæ could also be reared on willow. I offered them birch, oak, and plum, which they tried to eat, but every day I had to register some deaths. Whether the larva of this species be naturally slow in its development or the food did not suit it, the second stage commenced only on June 5th, eighteen days after the hatching, and the third stage on June 26th. The larvæ kept on dying every day till the end of July, when only three were left, and the last one died in August. This was a great disappointment, for the larvæ (which live in families) were large and very lively, and they had eaten the greater part of the shell of the egg before making their exit out of it. In the first stage the smaller larvæ are red, the head is large, shining, and black; the legs also are black. The larger ones (in all probability, those which are to produce the female moths) have a black ring round each segment; this ring is formed by a number of small black tubercles nearly touching one another. This ring of small tubercles was the only difference I observed; otherwise they were like the smaller larvæ. In the second stage the larvæ are of a fawn colour, with black tubercles covered with white thin hairs; the base of the tubercles is yellowish white, and the head black.

The following is a list of African Bombyces, including three already mentioned:—

BOMBYX BAUHINIÆ. Very much recommended as a silk producer.

BOMBYX ANNULIPES, Boisduval.

SATURNIA CAJINI, Guérin-Ménéville.

BOMBYX RADAMA, Boisduval. A species common in Mada-

gascar. The larvæ live in families, and form large bags or nests containing several hundred cocoons, the silk of which is utilised.

BOMBYX DIEGO. A species not so well known as the preceding one, but living in the same manner.

BOMBYX FLEURIOTII, Guérin-Méneville. Little known; is used in the manufacture of the Lambas on the southern coast of Madagascar.

SATURNIA AURICOLOR, Mabille.

SATURNIA FUSCICOLOR, Mabille.

BOMBYX PANDA. Lives like *radama*, and produces a highly valued silk.

SATURNIA VACUNA, Westwood. Lives in Ashantee.

SATURNIA MYTHIMNIA, Westwood. Port Natal.

SATURNIA BELINA, Westwood. Zululand.

SATURNIA HERSILIA, Westwood. Congo.

SATURNIA MENIPPE, Westwood. Natal and other parts of South Africa.

SATURNIA TYRRHEA, Cramer. Cape of Good Hope and other parts of South Africa.

SATURNIA NENIA, Westwood. Congo.

SATURNIA AGATHYLLA, Westwood.

SATURNIA SAID, Oberthür. Fine and large species, found by M. Raffray at Bagamoyo, opposite the Island of Zanzibar.

SATURNIA THYELLA ZAMBERIA, Felder.

(To be continued.)

NOTES AND OBSERVATIONS.

RE-APPEARANCE OF *APORIA CRATEGI*. — Mr. Douglas Stockwell deserves the thanks of all lovers of butterflies, and of all true entomologists, for refraining from the publication of a more precise locality than the county in which *Aporia cratægi* has been captured this year (*ante*, p. 332). The county is enough for scientific purposes; and doubtless Mr. Stockwell can, if challenged by entomological authority, give any particulars required in the way of evidence, and in such a manner as would baffle the dealer and omnivorous collector. It is fortunate that Mr. Stockwell has followed the example of the editor of the 'Field' rather than that of Mr. Frohawk (*vide* Entom. xxv. 217). — HAROLD HODGE; 6, Crown Office Row, Temple, Oct. 11th, 1896.

THE GEOGRAPHICAL VARIETIES OF *PARNASSIUS APOLLO*. — I sincerely hope that numerous British entomologists who appear to be paying increased attention to European butterflies will not adopt Mr. Harcourt-Bath's suggestion that varietal names should be given to every form of *Parnassius apollo* which he or others think they can separate. We have already a great deal too many named varieties of European butterflies, many of which can only be distinguished when what some

German dealers call typical examples are picked out. I have fifty-three specimens from various parts of Europe and Asia, not enough to illustrate the species; but if you begin to name every form which shows a little difference, you may just as well make ten as three varieties. This will apply to many other species, and my experience goes to prove that a number of the forms named in Staudinger's last catalogue will eventually have to be struck out when we know more about them.—H. J. ELWES; Colesborne.

VANESSA ANTIOPA.—Mr. Kirby's note on this species might lead persons who have not access to a large collection to suppose that there were races or constant local forms of this species distinguished by the colour of the margin. An examination of the twenty-two specimens (selected from much larger numbers) in my collection does not bear out this idea. Of European specimens I have only six—two from Stettin, two from Constantinople, two from the Alps—all of which have pale straw-coloured borders. Next I have ten North American specimens from such widely separated States as Washington, Colorado, North Carolina, and New York, as well as from Lower Canada, Lake Superior, and British Columbia. These are not on the average larger, as Mr. Kirby says, but their border is (except in the Lake Superior example) rather darker, and much more freckled with black specks. Then I have five—a fair sample of perhaps fifty—taken by my native collectors either in the Chumbi valley of Tibet, or the high valleys of Bhutan which adjoin it. This is the only locality from which any specimens have been procured by Indian collectors, and, as far as I know, the insect does not occur in Kashmir, Ladak, or the N.W. Himalaya. These specimens have borders, not white, as Mr. Kirby says the Bhutan ones in the Museum have, but dull yellowish, much freckled with black specks, and could not be distinguished from the N. American ones. Lastly, I have a Japanese specimen, whose border is intermediate in colour and freckling between the European and American or Himalayan examples. Though the tendency to vary is usually greatest in species which have a very wide distribution, yet this seems not to be the case in *antiopa*; and I can hardly believe that in England alone a variation which may occur anywhere has become fixed, especially as many English specimens are old, worn, and faded, and some of doubtful origin. Mr. Kirby's suggestion that the white-bordered variety is more or less a mountain insect seems to me to rest on very slight evidence.—H. J. ELWES; Colesborne, Nov. 1st.

VANESSA C-ALBUM, VAR. HUTCHINSONII.—I see that a slight controversy has arisen as to the varietal name of the brightly-coloured summer variety of *Vanessa c-album*. Formerly the existence of this form was here denied, but by the unremitting energy and care of Mrs. Hutchinson it was some years ago well established. At the same time Mrs. Hutchinson, with her invariable liberality, supplied our collections with this beautiful insect, furnished larvæ and pupæ for figuring, and exerted herself in all ways to make its history thoroughly known. One suitable, though very small, acknowledgment was made of this when the pretty summer form was named in her honour. So comparatively short is the period since passed, that

it seems strange to see Mr. Harcourt-Bath's assertion (*ante*, p. 257) that "no name appears to have been given to this very distinctive seasonally dimorphic form." Perhaps it is fortunate—since the name proposed by him, *lutescens*, is not very suitable to an insect which is not yellow—that the prior name *hutchinsonii*, given by Mr. Robson, exists. That no doubt may remain in any one's mind, I venture to furnish extracts which will show, not only that the name was given, but also that it is known and used. Forty years ago I used to take *V. c-album* in Shropshire, as I since know, in two broods; it is interesting to know, from Mr. Harcourt-Bath's statement, that it is still there.—CHAS. G. BARRETT.

"*Vanessa c-album*.—The summer form is so different and so constant in its appearance that it ought to have a distinctive name, and we suggest that it be called *hutchinsonii*, in compliment to that lady whose liberality has enriched so many cabinets with specimens, whose knowledge of the species is not exceeded by that of any one living, and to whom we are greatly indebted for information mentioned above, and for the larva and pupa figured.—J. E. ROBSON."—'*Young Naturalist*,' vol. ii. p. 110.

"*Vanessa c-album*.—Common, some years especially so, *e.g.* 1887. The var. *hutchinsonii* (spring brood) may be obtained.—E. W. BOWELL; Hereford."—'*Entomologist's Record*,' vol. ii. p. 136.

Mr. Harcourt-Bath is quite mistaken when he states (*ante*, p. 257) that he was the first to discover that the pale form of this species "only occurs as an aberration of the first generation in the season in this country." I pointed this out to Mr. Doubleday many years ago, and to many other entomologists since. I should be thankful to anyone who remembers my doing so, if they would corroborate my statement. Mr. Harcourt-Bath politely calls on me to state "where a definition under the cognomen" (of *hutchinsonii*) "was published." I am obliged to him for doing so, as it enables me to correct an error in the '*Entomologist*' for last month, where, trusting to memory, I stated that Mr. Doubleday named the spring form after me. On going to look, I find it was Mr. Robson, of Hartlepool, who did so, as any entomologist can satisfy himself, by referring to '*The Young Naturalist*' for Feb. 15th, 1881, or by consulting '*A List of British Lepidoptera and their Named Varieties*.' All my rearing is carried on in a room without any fire, with windows to the north and east.—E. S. HUTCHINSON.

[Some interesting remarks by Mr. Frohawk, on the pale form of *Vanessa c-album*, will be found *Entom.* xxvii. pp. 288, 289.—Ed.]

ON PRESERVING SPIDERS.—It sometimes surprises me that the study of spiders does not occupy more of the time and attention of naturalists, although I account for this partly by the difficulty of preserving the specimens; bottled spiders are not attractive. Of late I believe the study has gained more adherents, and the result of a few experiments I have made in preserving them may be useful. It is desirable that spiders should be attached to and set, like Coleoptera, on cards, but hitherto this has not been practicable, owing to their tendency to rot or shrivel. To obviate these defects I have tried preparing them by the same process microscopists have of hardening

animal tissues, and have met with some success. First I keep them a day or two in Ranvier's alcohol, and then in one of the bichromate of potash liquids; then wash in water, and finally dehydrate in absolute alcohol; they are then fit for setting. Some I did last spring are unchanged, and even the abdomen is not contracted. I think that when naturalists know they can be so preserved as to be readily compared and look presentable in a cabinet, they may take to them.—B. PIFFARD.

UNIFORMITY IN SETTING LEPIDOPTERA.—Mr. Walter Dannatt's remarks (*ante*, p. 330) express exactly my own views on the subject. I quite fail to see any necessity for flat-setting high or otherwise. The main argument adduced in its favour is that insects so set are more readily and easily examined, but surely this is a very slight one, and quite inadequate to compensate for the great loss in appearance which such specimens sustain; for I quite agree with Mr. Dannatt that flat-set insects look unnatural and painfully artificial. It seems to me that we collectors of British Lepidoptera are desired to set our specimens flat simply for the benefit or convenience of those who go in for foreign insects as well, and we are accused of having "insular prejudices" and the like because we do not at once adopt the style. There is no prejudice at all in the matter that I can see. It is not given to everyone to have the means, the time, or the desire to do more than collect the British species; and, such being the case, they who have thus to confine their energies simply prefer to retain the curved mode of setting; but they find no fault with those who collect foreign insects as well, and who do not see as they do. Uniformity in height on the pin is certainly desirable, but this can be arrived at equally well with curved as with flat-setting. The former is the hallmark, so to speak, of a British insect, and I trust will so remain.—E. SABINE; Erith.

HIGH-FLAT SETTING OF LEPIDOPTERA.—Mr. Walter Dannatt's remark on this subject (*ante*, p. 330) seems to me to be one-sided and prejudiced; so much has lately been said on the subject that I cannot understand where the objection to high-flat setting, which is now adopted everywhere, except in this country, comes in. And even in London the British Museum is resetting its specimens, if I am rightly informed. If, as Mr. Dannatt says, high-set specimens are classed at once as "continental," what prevents a dealer, or anyone, to reset his specimens and give them out as English, if he feels so inclined? the setting *alone* is no guarantee. Then, as to the exploded idea of looking "natural"; this seems to me to be still more absurd. If we talk of natural, we must not put the insect on a pin, and whether the wings are drooping or not, neither is natural—if this word must be used—since moths are not found in such positions as are shown in cabinets, whether they are high- or low-set. How often has the objection been pointed out to the English way of setting, in giving mites a beautiful chance of attacking the insects which all touch the bottom of the drawers, the small pins which nobody can get hold of properly, and other disadvantages; and if anyone will look at a drawer of Lepidoptera, as shown by Mr. Elwes and others at the Entomological

Society, set in the continental fashion, I think he must have a peculiar taste if he prefers the old style to the new. To speak of "laws of nature," when setting is concerned, seems to me to be entirely out of place.—M. JACOBY; Hemstall Road, W. Hampstead.

"APPLE TREES AND WINGLESS FEMALES."—I think that few practical entomologists will agree that Mr. Arkle has made out his case, *viz.* that the males *do* carry up the wingless females, and thus evade the grease-ring (*ante*, p. 193). I was not specially referring, in my previous remarks, to fruit trees, but to forest trees generally. If the males *do* carry the females, it must be either by accident or design. I do not say that it is impossible, but that it is highly improbable. *Cheimatobia brumata* is, I believe, one of the most destructive insects that the fruit-grower has to contend with, and the male of this species is a particularly weak flyer, and very unlikely to accomplish the feat. As far as design is concerned, I am not prepared to admit that any species could develop this tendency since grease-bands or any other preventive methods were invented. The arrangements adopted are most likely not sufficiently efficacious to ensure the capture of all the females as they ascend the trunks. There is also another matter to consider, —the distribution of these larvæ (and those of the genus *Hybernina*) by wind. Mr. Arkle admits that some fruit-growers say that the grease-rings are useless, and in that case they probably do not adopt them. Owing to their common habit of suspending themselves, a strong wind would easily account for the presence of larvæ in a neighbouring orchard. Last spring Hawk Wood, Chingford, presented a most remarkable spectacle. The larger trees—oaks, hornbeams, &c.—were enveloped as it were by huge cobwebs, and the long strands of twisted threads were floating in the wind to a considerable distance. Upon these silken ladders multitudes of larvæ (mostly those of wingless females) were ascending and descending. Finally, I do not think that it would be wise to assume that the males carry up the wingless females until we have further proof, as entomologists generally have very little faith in newspaper entomology, owing to the many misleading statements that have from time to time been published in the daily press.—ALFRED T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W., Aug. 20th, 1896.

THE FRONT LEGS OF *AGRIOPIS APRILINA*.—I bred a few specimens of *Agriopis aprilina* last autumn, and overcame the difficulty of getting out their front legs by letting them remain in the cyanide bottle about thirty-six hours. By this means the whole insect becomes much softer, and the legs come out as easy as those of any other moth.—F. MILTON; 7, Chilton Street, Bethnal Green, E.

ENTOMOLOGIST *v.* COLLECTOR.—It has struck me, while reading the remarks on the above subject of various contributors to the 'Entomologist,' that the exact position of neither class has been at all clearly defined. I will endeavour to do so on purely theoretical grounds, and then perhaps it will appear that the problem can be reduced to comparative insignificance. As the terms stand, the only possible difference that suggests itself between the two classes exists in the supposition that while a "mere collector" does not set about his work with

intelligence, the entomologist is essentially scientific. When the "mere collector" begins to set about his work with intelligence he ceases to own the name, and becomes an entomologist, as full-fledged and as essentially scientific as the propounder of natural laws and the theorist. The individual (and this an instance of a mere collector) who designedly picks up shells on a sea-shore with no other purpose than to consign to a smaller area objects that have been diffused over a greater is looked upon by me, and, I will venture to say, the rest of humanity, including Mr. Claxton, as not only far from being a conchologist, but as little short of a monomaniac. And yet, despite the fact that Mr. Claxton and the class he represents stigmatise themselves with the incriminating appellation of "mere collectors," we find they venture to defend themselves on the ground that they are seeking to acquire a full appreciation of the beauties of nature. In other words, Mr. Claxton and his colleagues, instead of striving to elucidate the scientific problem of enjoying the natural beauty of the earth (which by the way is the ultimate scientific problem) through the medium of natural laws, have attacked the subject in a wider and more direct field. On the other side of the question, to accuse real scientific men of trying to think away the beauties of the objects they investigate, is a mistake that belongs to an old and uneducated school. I think it probable, however, that Mr. Claxton has excellent cause for appealing against the attacks of those that have necessarily sprung into existence, like the tares with the wheat, together with the "new order" that has been destined to replace "the old."—G. W. SMITH; College, Winchester.

I should like to be allowed to make a few suggestions on the subject brought forward by Rev. W. Claxton (*ante*, p. 286). He there defines collectors as "those whose only object is to obtain a more intimate knowledge of the external appearance of the wonders of creation." Now, omitting the words "external appearance of" and using "creation" in a somewhat metaphorical sense, this appears to me to be an accurate statement of the aim of every scientific worker: for, as Huxley has said, a scientific "law" is "nothing more than the statement of the order in which facts occur," and I suppose no one will dispute the proposition that as long as any one is trying to further such a knowledge, either of external appearance or any other attribute of insects, he is, *ipso facto*, an entomologist. I expect, however, most of us will doubt whether the definition quoted applies even to most collectors; such persons seem as a rule to be imbued with a sort of commercial spirit and respect for public opinion which is very far removed from that of the pure searchers after truth that Rev. W. Claxton would have us believe they really are, *e.g.* the collecting of varieties, which has become fashionable of late years, has been pointed to as a more scientific mode than the old one of preserving normal specific types, and regarding all departures therefrom as worthless; and no doubt this is a true view, but nevertheless the scene often seems to have been merely shifted from specific types to varietal types without changing the background, with the result that the less striking intermediate forms are not considered as good as the extreme forms, and this has in some cases led to a struggle among varieties for a place in our cabinets, much to the detriment of those unfortunate specimens which

have been left unnamed: this is, of course, by no means universally applicable, and it often arises from a want of space; but it is surely calculated to improve our knowledge to a greater extent, if we limit the number of species we collect and study all their varieties, than if we collect a large number of species and necessarily limit ourselves to a few varietal types. There is also a prejudice common to, I think, most collectors, that a specimen is very nearly useless unless in perfect condition; and the way in which a valuable specimen is sometimes discarded, when its antennæ are missing or one wing is chipped, because it "spoils the look of the series," is, to say the least, unscientific. Such vagaries as these often completely invalidate assumptions drawn from collections as at present constituted, and it is perhaps noteworthy that, until more rational methods are employed, only those who are collectors themselves are in a position to "apply their knowledge to the deducing of general laws." Another case I should like to draw attention to, concerning the addition to our scientific results that might result from a sacrifice of the look (and commercial value) of a specimen on the altar of knowledge, is that of "gynandrous" forms. If those who are fortunate enough to meet with such were either to dissect, or cut sections through, the abdomen, a great deal might be learnt of the dependence of secondary sexual characters on the development of the sexual organs. I have already taken up too much valuable space, but I hope I have shown how useful it is for every entomologist to be a collector, although, of course, I quite agree with Mr. Harcourt-Bath (*ante*, p. 293) that some collectors have no more claim to be entitled entomologists than postage-stamp collectors have to be entitled geographers, or coin-collectors historians. I think it may be interesting to note Darwin's opinions on collectors. He says, in a letter to Sir J. D. Hooker:—"It is an old and firm conviction of mine, that the naturalists who accumulate facts and make many partial generalisations are the *real* benefactors of science. Those who merely accumulate facts I cannot very much respect" ('Life and Letters, C. D.' vol. ii. p. 225).—F. P. BEDFORD; King's Coll. Camb. Nov. 16th, 1896.

Ante, p. 330, we have "the first instalment to the list" of those "who professed a profound contempt for the mere collector" before us. It seems somewhat sad to bring forward such an unchristian feeling on the part of one who has passed from among us; still it is rather amusing that no *living* entomologist has the courage to confess "profound contempt" for a rather large number of his inoffensive fellow-creatures.—(Mrs.) E. S. HUTCHINSON; Grantsfield.

ON REARING *ACHERONTIA ATROPOS*.—May I add a contribution to the queries, information, and discussion going on in the 'Entomologist' upon the method of treatment best calculated to obtain the perfect insect from the pupa of *A. atropos*? My friend the Rev. Augustine Chudleigh, of West Purley, Wimborne, consulted me, in August last, upon the above point, as he was then feeding a nearly full-grown larva. I recommended him to adopt the "forcing" system, and below I add verbatim his report upon the matter:—

"I kept the pupa, as you directed, on the verge of stewing; in a roll of flannel, open at the ends, it lay on two quarts of earth which

three-quarters filled a large flower-pot. The whole was enveloped in a wool rug, as in a great 'tea-cosy.' To keep up heat and damp, and to keep down fungus, I poured half a pint of boiling water on the earth on alternate days, and stood the whole affair for a couple of hours on the stove on the intermediate days. While these fiery ordeals were going on I kept the pupa in its flannel in a box in my breast pocket. On Oct. 5th I heard a mouse-like squeak coming from under the rug, and on unfolding it a brisk healthy moth climbed on to my hand. I lodged it under my large microscope-shade of thin glass, with beech-sprays to climb on, and I fed it on honeycomb and a doll's saucer of water. As days went by the colours improved wonderfully; the skull and bones—not crossed—became singularly distinct, far better than on any museum specimen I have seen. On the 10th, when I had got a good diagram and notes of the insect, and when everyone in the house had studied it to the full, I let it fly, about dusk. I was surprised at the strength of its flight, but it had a bat-like flittering; and I can quite believe that I have seen many a 'death's-head' on the wing, and have set them down as bats."

The above may, I think, be taken as an extreme instance of the forcing method—equable heat, moisture, and care to prevent fungoid growths. At the same time I had myself a larva of this moth, and determined to adopt the ordinary method by which I have in past time bred several of the perfect insects in the following spring. My larva on this occasion buried itself at the bottom of a flower-pot of friable earth, kept damp and out of doors, but not *wet*; it formed a sarcophagus considerably larger than itself, and then changed to a pupa. After several weeks I carefully broke the sarcophagus, in which the pupa lay, and have kept it since that in a large biscuit-tin, in a room where, with a fire every day, the temperature varies from 48° to 55°. It is still a pupa, bright-coloured and lively. I am careful to note whether any appearance of mould appears on the earth, and to keep it just damp. Whether this method will be as successful as Mr. Chudleigh's remains to be seen.—O. P. CAMBRIDGE; Bloxworth Rectory, Oct. 29th, 1896.

GONOPTERYX RHAMNI IN IRELAND.—I believe I am right in saying that this butterfly does not occur in Ireland, neither do either kinds of buckthorn. It has been "reported" from Killarney, but it is more than doubtful. I determined to try and introduce it in the vicinity of Tipperary, and, by only planting the buckthorn over a small tract of country, to see whether a small, self-sustaining colony could not be formed. In 1890 I obtained 1000 plants of *Rhamnus frangula* from Messrs. Dickson's, Chester, and had them planted about the place among the shrubs and woods. About half of them did well, the rest succumbing to the rabbits and unfavourable soil. In 1894 I planted 1000 more, with about the same result. A few plants of *R. catharticus* were mixed with these, but did not do well. In August, 1894, Mr. Cooke, of Museum Street, sent me about 250 of the butterflies, and these I turned out about the place. The weather was very unfavourable, and I hardly saw any more of them that year. I left for India that autumn, and only returned in May this year, and there was no one to observe whether they had been seen in 1895. About the first week in June I

was over in Ireland, and I found the larvæ feeding on almost every buckthorn bush in the place. Some bushes, quite isolated, had been discovered just the same. In a walled-in garden I had placed about half a dozen bushes of *R. catharticus* by themselves; these had been patronised too. I observed one very late female depositing eggs. My next visit was at the end of August. Whenever the sun was out *G. rhamni* was out too, and one morning I should think I could have netted about fifty, nearly all males; from which I infer that the females lie low in the autumn. The ground over which the bushes have been planted is rather less than 500 acres, partly plantation and partly open ground covered with bracken, &c. The buckthorn bushes do not do well, and I doubt there being more than 800 healthy ones growing. This means they are pretty widely scattered. The butterflies are generally to be seen feeding on thistle-heads, black knapweed or scabious, and have formed three or four distinct colonies; at least, so it seemed in the autumn. In my opinion the butterfly is now thoroughly established, and, as long as the food-plant continues to grow, it should thrive. Their power of scent (?) must be wonderful for a limited number of butterflies, turned out in a strange land, after an interval of some months, succeed, first to find each other, and then to find the scattered bushes.—E. B. PUREFOY, 16th Lancers.

POLIA NIGROCINCTA.—In reply to Mr. Thorpe's question, "Is it usual for a portion of the ova of *Polia nigrocincta* to hatch out in the autumn?" (Entom. xxix. 287) I answer no; but—as the boy said when asked if it always rained in the north, "No, sometimes it snaas" (snows)—I have known *P. nigrocincta* eggs to hatch partially, exactly as Mr. Thorpe's are described to have done; but if your readers will refer to the 'Entomologist's Monthly Magazine,' vol. vi. p. 60, it will be seen that the whole brood is known to "sometimes" hatch out in autumn and hybernate small, &c.; and in the 'Entomologist,' vol. x. p. 20, Mr. James Leather states that over 200 eggs deposited by a bred female of *Polia nigrocincta* hatched out on April 20th, 1876, and concludes, "My chief object in sending these notes to the 'Entomologist' is that they may settle the question whether or no the larva hibernates. It has been stated that such is the case. This is now proved not to be so," &c. Our old friend H. D. (Ent. Mo. Mag. vi. p. 90) says Mr. Gregson has certainly made a "mistake in his accounts of the larva of this species." But no mistake was made; and now, after twenty years, we seem to be all right, and the genus *Polia* wrong; for if all *Polias* "should hatch in spring only," then *nigrocincta* is not a *Polia*: sometimes it "snaas," that's all! Nevertheless, Mr. Thorpe's fact and question bring out how little we know, reminding us of the old fable, "Once there was a wise man and a fool; the wise man studied his subject and decided; the fool *decided*!" Old entomologists will remember *Polia occulta* in our books and lists. At that time we had nine *Polias* in our lists; six of them have been deleted, and a now dubious one added, *nigrocincta*, leaving *chi*, which certainly, under my care, at various times has hatched out in the autumn just as *nigrocincta* has repeatedly done. If all *Polias* "only hatch in spring," then we can only retain *flavicincta* as representative of the genus *Polia* in our lists. I may say I never bred *flavicincta*, nor do I know anything

about its morphology. It may interest your young readers to know that I have before me as I write *Aplecta (Polia) occulta* just stretching from pupa, and five or six pupæ showing above the soil they pupated in. In other large flower-pots I have larvæ full-fed, and two lots of small larvæ will hybernate; all bred from one large batch of eggs deposited in the middle of last July, and fed on common dock. One of two friends here on Thursday night last said that all the *occulta* larvæ I gave him went down, and one perfect specimen appeared in September, another two weeks ago; and the other said, "My larvæ are all down but two, but I have not got any imagoes yet" (both lots were fed indoors on dock). Another friend wrote me from Yorkshire on the 21st inst., "All the larvæ of *occulta* that you sent me, except three or four—one-third grown—are safe down. I fed them on elder and sorrow, which they seemed to prefer to any other food." I refrain from further illustrations of how little we know, to save me trouble and you space.—C. S. GREGSON; Rose Bank, Fletcher Grove, Liverpool.

CAPTURES AND FIELD REPORTS.

POLIA NIGROCINCTA IN CORNWALL.—I captured a female specimen of this species at the Lizard on Sept. 18th.—ARTHUR P. JENKIN; Redruth.

ANOSIA MENIPPE (PLEXIPPUS) IN ENGLAND.—My sister, whilst at the Lizard, Cornwall, last month, states that she saw a specimen of *Anosia plexippus* [*Anosia menippe*, Hübn., *ante*, p. 188]. She was sitting close to the edge of the cliff when the insect sailed slowly by her, so close that she could plainly see the markings on its wings. She was unable to catch it, having no net and being impeded with painting appliances. I do not think it likely that my sister was wrong, as the insect is not one to be easily mistaken, and, moreover, she knows it well by sight, having been present when my brother and myself took three specimens eleven years ago, two of them in almost exactly the same spot as she now reports, and she has seen the specimens many times since in our collection. Our previous capture is reported, Entom. xviii. 291. I should be very much interested to hear if any other appearances have been recorded this autumn.—ARTHUR P. JENKIN; Redruth, Oct. 13th, 1896.

PIERIS BRASSICÆ.—In view of my previous note (*ante*, p. 126) it may not be without interest to record the reappearance of this species in this locality. No specimens of the first brood were seen, although searched for with care. The first specimen of the second brood was noticed on July 9th, from which date specimens were observed almost daily for several weeks, the last being seen on Aug. 21st. It occurred, however, in very limited numbers, in fact, not more than about fifty specimens being seen in all. Males and females seemed to be in about equal numbers. Neither larva nor pupa has been met with.—W. GROVER; Guildford, Nov. 1st, 1896.

LYCÆNA ARGIOLOUS.—I can corroborate the note of Mr. Jefferys (*ante*, p. 333) respecting the unusual abundance of *L. argiolus*. In this district the first brood was much commoner than usual in May; but it was at least three weeks late. I have never met with a second brood here until the

present season; it was out (in even greater numbers than the first) by July 15th. It was particularly abundant about a thick hedge which runs along the top of the chalk ridge east of the town. There is practically no holly and very little ivy there; and when they were not sipping the nectar from the bramble-flowers, it was observed that the common buckthorn (*Rhamnus catharticus*) was in almost every case chosen as a resting-place, so it is more than likely that that shrub was the food-plant in the present instance. The most remarkable thing was the extreme scarcity of the females, the proportion seemed to be about one female to a hundred males.—W. GROVER; Guildford, Nov. 1st, 1896.

RHOPALOPSYCHE NYCTERIS IN ENGLAND.—An example of this species was caught by one of my sons at Exmouth some time since. It has been identified by Sir George Hampson at the British Museum. Doubtless it has been imported accidentally into England, but the occurrence is genuine.—FRANK STONE; 94, Palace Gardens Terrace, W., Nov. 9th.

NOTES ON THE RHOPALOCERA.—That the past season has been rather eccentric as regards the time of appearance of Rhopalocera the following will testify:—*Lycena icarus*. Two specimens were captured on April 17th.—*Euchloë cardamines*. A male was seen as late as June 13th.—*Pieris brassica*. Larvæ feeding during the middle of October.—The *Vanessidæ* were very scarce, with the exception of *V. urtica*, which was, however, abundant in the first brood. The primary cause of the extreme scarcity of the three usually common species seems to have been due to the very wet weather at the time when they usually emerge; from Aug. 21st till now, as I am writing, there have been only about nine days without rain; the weather during the whole time was cool, and there was but little sunshine. Although I kept a sharp look-out I only observed four specimens of *V. atalanta*, about a dozen *V. urtica* (second brood), and not a single specimen of *io*. Larvæ of *urtica* and *atalanta* were abundant enough; I bred some numbers of both. All were found on or about Aug. 27th (the time when imagines are usually pretty freely on the wing). The first *urtica* emerged Sept. 22nd; last, Oct. 10th. First *atalanta* Sept. 27th; last emerged rather earlier than those of the other species. Both insects were placed under exactly the same conditions, being reared indoors. The district which I am working does not seem to produce any species out of the common, the best capture this year being two *Vanessa c-album* last July at bramble-blossom.—A. D. IMMS; Linthurst, Oxford Road, Moseley, Worcestershire, Oct. 12th, 1896.

NOTES ON ORTHOPTERA.—On Aug. 8th last, near Christchurch in Hants, I met with *Ectobia panzeri*, Steph., our smallest cockroach, in some numbers. They were found under dead seaweed and other rubbish, but a few yards from the shore, and on ground that would apparently be often washed by the sea itself. They were very active, and as soon as uncovered hurried away out of sight. The females were, perhaps, rather commoner than the males, and many specimens of both sexes were dark, especially in the legs. In the New Forest, at the beginning of August last, *Nemobius sylvestris*, Fabr., the smallest of our crickets, was very common near Brockenhurst, though some patience was required to catch any number, for they run about very rapidly amongst the dead leaves and other rubbish, and occasionally vary their movements by short hops of about nine or ten inches in length. While catching *N. sylvestris* I secured two specimens, a

male and a female, of *Thamnotrizon cinereus*, L., a somewhat singular-looking, almost wingless grasshopper, but saw no more than the two. During October I have been receiving considerable numbers of *Periplaneta australasiæ*, Fabr., the latest of the cockroach tribe to establish itself in these islands. They came from Kew Gardens and from Bishop's Waltham in Hants, and since the consignment consisted of insects, both male and female, in all stages of development, it is clear that they are holding their own in both localities. I noticed that the females are somewhat larger than the males; and have the yellow border to the pronotum more pronounced than in the latter sex. On Nov. 7th I received from the Royal Horticultural Society's Gardens at Chiswick a finely-grown specimen of the handsome cockroach, *Periplaneta americana*, L. As I received no memorandum with it, I cannot say whether it is thoroughly established there.—W. J. LUCAS.

BRYOPHILA MURALIS FROM S. DEVON.—This pretty moth has been fairly plentiful this season on the walls around Dawlish and Starcross. Mr. Bignell informed me that he took it in that locality on July 1st, but I found them still in splendid condition up to the end of August. Just ten years ago I took a long series of the dark brown form, which I exhibited at the South London Entomological and Natural History Society. They were confined to an old wall skirting a market-garden at Dawlish. The following year this wall had disappeared, in order to make room for lodging-houses, and I have never met with the same form since, although I have repeatedly looked for them. My specimens of this season are all dark green with a bluish tint.—J. JAGER; 180, Kensington Park Road, W., November, 1896.

SCARCITY OF INSECTS IN AUGUST.—From Aug. 12th to 19th I was in North Devon, and from the 20th to the 31st in the New Forest, keeping a very keen look-out for insects during the whole time, but never before have I seen so little in that way. Butterfly life was almost entirely absent; even the commonest species, such as *Lycæna icarus* and *Vanessa atalanta*, hardly putting in an appearance. *Pararge egeria* alone showed up in anything like its usual numbers. In the New Forest, where I was staying with an entomological brother, Canterton being our headquarters, we really worked hard, sugaring laboriously every night, the result being a good series of *Amphipyra pyramidea*, and a few still commoner Noctuæ. In desperation we turned at last to pupa-digging, where luck was not quite so dead against us, a comparatively few hours' work producing over two hundred pupæ of various species. I believe there is usually little to be done in the way of collecting in the New Forest at the end of August, and the early season probably accounts for any scarcity of insects beyond the average; but the remark does not apply to Devonshire, or the west country generally, an area with which I have had a long entomological acquaintance. The phenomenon most difficult to explain was the utter absence of the larger *Vanessæ*. Since leaving the New Forest I have been in Yorkshire (Wharfedale) and Scotland (east coast), but entomological work has been quite out of the question.—HAROLD HODGE; 6, Crown Office Row, Temple.

ACHERONTIA ATROPOS IN DEVON.—From the records in the 'Entomologist,' larvæ of this species seem to have occurred abundantly in many parts of the country. As Devonshire has not been mentioned, I may say that during my stay at Starcross in August and September this year,

several of these larvæ were seen, taken and killed. In one instance a girl threw a brick at a larva, under the impression that it was a young snake. I obtained one which went to ground about August 20th. Having at different times failed to rear the species, I adopted the plan suggested by Dr. Livett, of Wells, and alluded to *ante*, p. 312, with the happy result that a perfect male imago emerged on the 30th ult. *A propos* the killing incident, I am reminded of what happened in the village of Radwinter, in Essex, some years ago, a note on which I sent to the 'Entomologist' soon after its occurrence. In this case a nightshade overgrowing a shed in a farm-yard had been completely stripped of the leaves by these larvæ. The villagers, believing them to be locusts, one day made the occasion a kind of holiday, and amused themselves by killing every one of them. Great was their chagrin when I enlightened them on this point, and informed them that they were worth about a shilling each.—J. JAGER; 180, Kensington Park Road, W., November, 1896.

ACHERONTIA ATROPOS.—Larvæ and pupæ of *Acherontia atropos* have been taken this season at Clevedon, Somerset, and at Cirencester, Gloucestershire. Some found at Clevedon, and reared by a friend who forced the pupæ a little, came out at the end of September. A pupa just given me in Gloucestershire, still alive, I propose forcing, which has not been done up till now. Is it not the case that hot, dry summers appear to be conducive to the prevalence of this moth?—T. B. JEFFERYS; 17, New King Street, Bath.

ACHERONTIA ATROPOS BRED.—Two larvæ of *A. atropos* were taken on Aug. 3rd last, at Rivenhall, Essex, and were sent on by a friend. One imago emerged on Oct. 23rd, and the other on the 29th of the same month; both are very fine specimens.—J. R. CATTLE; 115, King Edward Road, Mare Street, E.C., Nov. 9th, 1896.

CATOCALA FRAXINI IN THE ORKNEYS.—A specimen of the above-named rare insect was captured by Mr. James Shaw, shoemaker, of 7, Bridge Street, Kirkwall, on Tuesday, Sept. 1st, on a telegraph-pole, below the farm of Laverock, on the road between Stromness and Kirkwall. My correspondent (Mr. John Flett, of Kirkwall), who has obligingly furnished me with these particulars, also enquires in the course of his letter,—“Would not the great prevalence of south wind this season account for the insect being found so far north?” I deeply regret having to add that Mr. Shaw passed away on Sunday, Sept. 13th, about a fortnight after this recorded capture. I may also state that the said specimen of *C. fraxini* was forwarded to me by parcel-post, and is in wonderfully good condition, considering that it was not bred from the chrysalis.—(Rev.) F. W. WALKER; Oct. 15th, 1896.

CATOCALA FRAXINI AT SCARBOROUGH.—A worn specimen of *C. fraxini* was captured in the Spa ground, Scarborough, on Oct. 3rd, 1896, by Mr. H. R. E. Grey.—J. H. ROWNTREE; Nov. 18th, 1896.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—October 21st, 1896.—Prof. Raphael Meldola, F.R.S., President, in the chair. Mr. J. J. Walker, R.N., exhibited a specimen of *Emus hirtus*, L., taken at Gore Court

Park, Sittingbourne, Kent, on May 30th last. Mr. W. B. Spence sent from Florence, for exhibition, some specimens of a cricket, *Gryllus campestris*, in small wire cages, which he stated were, in accordance with an ancient custom, sold by the Italians on Ascension Day. Mr. F. Enock exhibited a specimen of the curious aquatic Hymenopteron *Prestwichia aquatica*, female, which Sir John Lubbock first captured in 1862, but which had not been recorded since that date until its rediscovery in May, 1896. Mr. Enock said that the male had remained unknown until June last, when he captured several swimming about in a pond at Epping. The male was micropterous, and, like the female, used its legs for propelling itself through the water. Mr. Tutt exhibited a beautiful aberration of *Tephrosia bistortata* (*crepuscularia*), in which the ochreous ground colour was much intensified, and the transverse shade between the median and subterminal line was developed into a brown band; the transverse basal, median, and subterminal lines on the fore wings, and the median and subterminal lines on the hind wings, being strongly marked in dark brown. It was taken by Mr. J. Mason at Clevedon in March, 1893. Mr. Tutt also exhibited the cocoons, pupal-skin, and aberrations of the imago of *Zygana exulans*. The cocoons were spun upon one another, five in a cluster, and Mr. Tutt stated that the species was exceedingly abundant in the pupal and imaginal stages during the first week of August on the mountain slopes above Le Lautaret, in the Dauphiné Alps, at from 7000 to 9000 feet elevation. The pupa-skin was very similar to those of other Zygæids. The imagines exhibited were all aberrations, and consisted of females of the ab. *flavilinea*, with bright yellow nervures; a large male and several females of the ab. *striata*, with the red spots more or less confluent and developed into streaks; also, a unique female aberration, in which the wing from the base to far beyond the centre was entirely crimson. Dr. Sharp exhibited a specimen of a lepidopterous insect that had been alluded to in the 'Entomologist's Monthly Magazine,' Sept. 1896, p. 201. It was a caterpillar which had received the eggs of a parasite on the anterior part of the body; the abdomen, nevertheless, went on to the pupal metamorphosis, while the head and thorax remained attached to it in the caterpillar stage. He also called attention to some peculiarities in the pupa of *Plusia moneta*, pointed out to him by Mr. Fleet; in this species the pigmentation varies greatly in extent, and is sometimes entirely absent. Mr. Blandford called attention to the recent discoveries relating to the Tsetse fly, made by Surgeon-Major Bruce in Zululand, which proved that this insect affected animals by infecting them with a parasitic Protozoon. The parasite was communicated from wild animals to domestic animals, and was probably more widely distributed than was generally believed, it or a closely allied form having been found in India and England in sewer rats. He said that Surgeon-Major Bruce had proved that the Tsetse fly was pupiparous, which was of importance as affecting the classification of the Diptera. Dr. Sharp said that in his opinion the Tsetse fly would cease to be troublesome with the advance of civilization. Mr. C. G. Barrett exhibited the pupa-skin, cocoon, and eggs of *Hesperia comma*, L., found on chalk-hills near Reading by Mr. A. H. Hamm. He also exhibited and remarked on a series of both

forms of *Tephrosia crepuscularia* and *T. biundularia*, showing an unbroken line of variation from brown to white and also to grey and black. In addition, he showed several second-brood specimens of both forms, obtained in the past summer by Mrs. Bazzett, of Reading. Mr. Tutt and Mr. Fenn made some remarks on the specimens exhibited. Mr. Tutt read a paper entitled "On the specific identity of *Cænonympha iphis* and *C. satyrion*," and exhibited a long series of specimens. The Rev. T. A. Marshall communicated a paper entitled "A Monograph of British Braconidæ," part vii. Mr. T. D. A. Cockerell communicated a paper entitled "New Hymenoptera from the Mesilla Valley, New Mexico." Mr. E. Meyrick contributed a paper entitled "On Lepidoptera from the Malay Archipelago." Dr. Sharp read a paper, by Mr. G. D. Haviland and himself, entitled "Termites in Captivity in England."—H. Goss and W. W. FOWLER, *Hon. Secs.*

November 4th.—Professor Raphael Meldola, F.R.S., President, in the chair. Mr. McLachlan exhibited a collection of the cast nymphskins of more than one-third of the species of European Dragonflies from the Département de l'Indre, France, sent to him by Mons. René Martin. Two or three of the species had been reared in an aquarium, but the identification of most of them has been secured by finding the imago drying its wings in the immediate vicinity of the cast skin. Mr. R. Adkin exhibited a long series of *Acidalia marginepunctata* taken on the sea-coast at Eastbourne, Sussex, during the past eight summers. The series included examples of a bone-coloured form with slightly indicated transverse markings; others much dusted with black scales giving them a deep grey tone, with well developed markings; and sundry forms intermediate between the two; also three taken this year, in which the whole of the wings, with the exception of a pale submarginal line, are densely covered with black scales, giving them a similar appearance to the so-called "black" forms that are found among some of the species of *Boarmia* and *Tephrosia*. Mr. Horace St. John Donisthorpe exhibited a female specimen of *Dytiscus circumcinctus*, Ahr., with elytra resembling in form those of the male. He said the specimen had been taken in Wicken Fen in August last. Mr. Tutt exhibited a specimen of *Mellinia ocellaris* recently taken near Southend, together with a specimen of *M. gilvago* for comparison; also four specimens of *Argyresthia atmoriella* taken by Mr. Atmore last June at Lynn, Norfolk. Mr. Tutt also exhibited a long series of a *Melampias* which he had captured at Le Lautaret, in the Dauphiné Alps, at an elevation of 7000–8000 feet. He observed that the specimens exhibited were peculiar in some very important particulars, combining some of the characteristics of *Erebia* (*Melampias*) *melampus* and *M. pharte*. He said his attention had been first drawn to this form by some fine examples captured by Dr. Chapman and himself on Mont de la Saxe in 1895. Compared with the Tyrolean examples of *M. melampus*, this form showed a tendency to a lengthening of the fore wings and to an obsolescence of the black dots, thus approaching *M. pharte*, but the females presented none of the typical characters of the female of *M. pharte*. On the whole, he felt satisfied that the Mont de la Saxe specimens were a form of *M. melampus*. Mr. Elwes observed that though all the continental butterflies had been so long studied by European entomologists, he did not think the form ex-

hibited by Mr. Tutt had been hitherto noticed. He considered that Mr. Tutt had made out his case, and he agreed in the conclusion at which he had arrived. Mr. McLachlan, Herr Jacoby, and Professor Meldola continued the discussion. Mr. E. Ernest Green exhibited a typical specimen of *Ephyra omicronaria*, together with what he believed to be a remarkable melanic variety of the same species, taken by Dr. Dudley Wright at Pegwell Bay, near Ramsgate, in September last. Some of the Fellows present, after an examination of the specimen, expressed an opinion that it was a variety of an *Acidalia*, and not of *Ephyra omicronaria*. Mr. Goss stated that Mr. Harry Fisher, the botanist to the Jackson-Harmsworth expedition, had returned to England. He hoped that he would have been present at the meeting to exhibit a few minute Diptera and other insects which he had collected in Franz Josef Land. Mr. McLachlan made some remarks on insects and flowers in high latitudes, and Mr. Elwes, Sir George Hampson, and Professor Meldola also commented on the subject.—H. Goss, *Hon. Secretary*.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—October 8th, 1896.—T. W. Hall, Esq., F.E.S., Vice-President, in the chair. Mr. Ficklin exhibited several species of Lepidoptera set in their natural positions of rest, thus showing the pattern of the transverse markings which adapted them to their surroundings. Mr. Carpenter, a male specimen of *Polyommatus (Lycæna) icarus*, with a completely bleached hind wing, from Folkestone; several female examples of *Pararge megæra*, bred from Ranmore Common, having a tendency to form a broad black median band; and a bred series of *Chrysophanus (Polyommatus) phlæas* from Abbot's Wood, having well developed blue spots on the secondaries. Mr. H. Moore, two large species of Orthoptera from Florida, viz. *Romalea microptera* and *Cyrtacanthacris subsittaca*. Mr. J. T. Carrington, *Calophasia platyptera*, a species of moth new to Britain, taken by himself between Shoreham and Brighton on Sept. 14th, 1896. The species is closely allied to the "shark-moths," and is a native of Central and Southern Europe. The larvæ feed upon toadflax. Mr. Ashdown, a specimen of the rare Coleopteron, *Molochus minor*, from Mickleham; and a black var. of *Toxotus meridianus* from Surrey. Mr. Adkin, a bred series of *Calocampa vetusta* from Sutherland; and a bred second brood of *Acidalia virgularia (incanaria)* from Brockley. Mr. Lucas, a hitherto unnoted variety of *Pyrameis (Vanessa) atalanta*, having the indistinct deep black blotches which are inferior to the red marginal band of the hind wings, with well-marked blue centres. It was captured near Ipswich by Mr. H. L. Hearsurn, of Kingston. Mr. Barrett, a pupa-case and cocoon of *Pamphila (Hesperia) comma*, which had been found by Mr. Hamm, of Reading; and also some eggs which had been deposited on stems of grass by an observed female. A discussion took place as to what was the usual food-plant of the species. The general opinion was that it was a grass-feeder, as are most Pamphilids. Mr. C. A. Briggs, a fly taken from a starling, presumably *Ornithomyia avicularia*, one of the Hippoboscidae infesting birds. Mr. H. J. Turner, a living specimen of *Uropteryx sambucata*, taken in his garden on Oct. 8th, and no doubt a second-brood individual.

October 22nd.—C. G. Barrett, Esq., F.E.S., Vice-President, in the chair. Mr. A. T. Potter, of Whangarei, Auckland, New Zealand, was elected a member. Mr. R. Adkin exhibited a series of very beautifully-marked specimens of *Hadena adusta* from Shetland. Mr. Ficklin, bred specimens of *Luperina cespitis*, from larvæ taken on grass-stems in the spring. He suggested that their small size was due to their proper food being grass-roots and not the green blades. A large number of specimens of *Tephrosia crepuscularia* and *T. biundularia* were shown by Messrs. Tutt, Henderson, Barrett, Auld, Mera, Mansbridge, De V. Kane, Tunaley, H. Williams, and Chittenden, forming such a collection of forms as, in the opinion of all present, had never before been brought together. In reply to Mr. Barrett's re-assertion, based on Mrs. Bazzett's captures, that these two were one species, Mr. Tutt read a very exhaustive paper. He assumed that the earlier species should be termed *T. bistortata* and the later one *T. crepuscularia*, as Mr. Prout asserted, and said that the difference of opinion among entomologists was largely a matter of the definition of a "species." They each had distinct life-cycles, distinct facies, and one had seasonal dimorphism, besides which each bred true to its own race. He showed that errors had arisen from statements made on insufficient data, and from too much reliance being placed on various authors' writings, such as those made in Newman's 'Moths.' He reviewed the discussion which took place some ten years ago in the magazines, and said that the consensus of opinion then was the same as his own. The opinions of the chief opponents were then discussed in detail, especially the various contributions of Mr. Barrett to the discussion. He showed by quotations that Mr. Barrett had accepted the idea of two species until he recently received certain specimens and data from Mrs. Bazzett, including some supposed second brood *T. biundularia*. After stating that these were undoubtedly *T. crepuscularia* second brood, he referred to the evidence offered as to distinctness by Messrs. Porritt, Fenn, and Tugwell, who had bred both species, and pointed out the differences which separated the two. He showed that parallelism was not a sign of unity of species, nor was it right to compare dates of years like 1888 with 1893. He discussed the Scotch forms, and remarked that they more nearly resembled the German specimens. Mr. Henderson said that he had taken *T. crepuscularia* in the very woods where it was stated by Mrs. Bazzett not to occur. His experience and remarks agreed wholly with Mr. Tutt's, and he mentioned that the late Mr. J. A. Cooper had reared a second brood of *T. biundularia*. The remarks made by the other exhibitors all tended to support the case as put forth in Mr. Tutt's paper. Mr. de Vismes Kane sent an account of the occurrence of the only species *T. biundularia* occurring in Ireland, together with a typical exhibit. In reply to the vote of thanks, proposed by Mr. Barrett and seconded by Mr. Auld, Mr. Tutt said that the idea of species was simply a matter of utility; and as there were two distinct life-cycles it was more convenient to consider them as two species, although they might be very closely allied. Mr. Montgomery reported that there was considerable doubt about his record, on September 24th, that *Noctua ditrapezium* occurred in Yorkshire.

November 12th.—T. W. Hall, Esq., F.E.S., Vice-President, in the

chair. Mr. R. Adkin exhibited long and varied series of *Acidalia marginepunctata* in illustration of his paper. Colonel Partridge, two dwarf, red, bred specimens of a second brood of *A. trilinearia* from Epping Forest. The annulated spots, which appear in the other members of the genus, were developed in these examples. Mr. Tutt had seen some of Mr. Merrifield's specimens bred under abnormal temperature, and they closely resembled these in the spots and colour. Mr. Auld, a specimen of *Zygana lonicera* from Chattenden, with semi-diaphanous under wings in part. Mr. Lucas, specimens of *Periplaneta australasiae* from Kew Gardens and Bishop's Waltham, consisting of males, females, and immature (wingless) examples, and said that the females had the yellow ring to the pronotum wider than in the male. Mr. Tutt, (1) specimens of *Orrhodia vaccinii*, very close in their coloration to *ab. glabra* of *O. erythrocephala*; (2) a series of *Zygana exulans* from Le Lauteret, the smallest from about 9000 feet elevation where the herbage was sparse, the larger were from 7000 to 8000 feet elevation; (3) two specimens of *Lithosia lutarella*, of the deep yellow form found all over the high Alps (they were seen assembling in large numbers, one very warm damp morning, in company with *Acidalia flaveolaria* and *Cleogene lutearia*); (5) both sexes of *Acidalia ochrata*, and stated that our British species is the *perochraria* of Stephens; (5) a series of the very beautiful *Psecadia pusiella*, a Tineina found in abundance at La Grave, and looking much like a large form of *Cerostoma sequella*. Mr. Barrett, on behalf of Mr. Day, of Cheshire, exhibited a series of forms of *Tephrosia biundularia* taken in March and May; he also showed a very fine series of the Unst forms of *Noctua festiva* sent to him by Mr. J. J. F. X. King. Mr. Tunaley stated that he had frequently found late *T. crepuscularia* at the same time as early *T. biundularia* in Sutton Park, Birmingham. Mr. R. Adkin read a paper entitled "Notes on the occurrence of *Acidalia marginepunctata*, and observations on the early stages of the second brood of *Cyaniris (Lycæna) argiolus*." A discussion took place, Messrs. Tunaley, Tutt, Mansbridge, and Barrett taking part, all bearing testimony to the value of Mr. Adkin's close observation of the latter species.—H. J. TURNER, *Hon. Report Sec.*

CAMBRIDGE ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—October 16th, 1896.—The President, Dr. Sharp, in the chair.—Exhibits:—By Mr. Jones, specimens of *Lycæna arion*. By Mr. Rickard, nest of a tree-wasp, and other locally interesting exhibits. By Mr. Fleet, two examples of *Caradrina ambigua*, and pupæ of *Plusia moneta* exhibiting remarkable peculiarities of pigmentation. By the President, a larva, believed to be of a species of *Hepialus*, which is at present doing much damage to vegetation in Northamptonshire; a pupa of *Sphinx convolvuli*, prepared to show the way in which the proboscis is folded in its case; also one of the colonies of white ants (*Calotermes domesticus*), exhibited a year ago, now *in extremis*. He said that one of the individuals had been transformed into an egg-producer, and specimens of the other Termites were seen in the spring carrying the eggs; the small colony had, in fact, established a "substitution queen," after the fashion described by Grassi.

October 30th.—The President in the chair. Exhibits:—By Mr. Rickard, a number of South African insects, including various Orthoptera of *Phymateus* and allied genera, and Hymenoptera; and a specimen of *Batracho tettiæ*, a very variable insect, whose colour is said to depend upon the nature of the ground in its neighbourhood. By Dr. Sharp, various stages of *Thysidopteryx ephemeriformis* from Washington, U.S.A., including some perfect insects which had emerged after their arrival in England. The President read a paper upon "Jumping Cocoons" (published simultaneously in the 'Entomologist' for November). He described the structure of the pupa and the mechanism by which it chisels and hammers its way out of the cocoon. He suggested that the "jumping" was produced by the efforts of the insect to free itself when the cocoon had by accident become detached from its moorings. Mr. Lamb remarked that the mechanics of the process were rather obscure.

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—November 9th, 1896.—The President, S. J. Capper, Esq., in the chair. Owing to the Secretary, Mr. H. B. Jones, going abroad, Mr. J. N. Pierce undertook the duties until the end of the year. Mr. F. N. Pierce read a paper entitled "Are hybrids hermaphroditic? some recent investigations in the genitalia," illustrated by diagrams and preparations shown by the micro-lantern. The author stated that, in the specimens he had examined, whereas the male hybrids, although distinct from the parents, were perfectly formed and apparently capable of copulation, the female was hermaphroditic, the genitalia containing the organs of both sexes. Dr. Ellis stated that in nature it was easier to produce males than females, and suggested that if the organs of females were more generally examined it would probably be found that instances of the male organs also being present would not be rare. Mr. Gregson exhibited varieties of *Abraxa grossulariata* and an *Aplecta occulta* bred by him that morning.—F. N. PIERCE, Hon. Sec., pro tem.

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—Sept. 21st, 1896.—Mr. P. W. Abbott, V.-P., in the chair. Exhibits:—By Mr. R. C. Bradley, *Ephestia kühniella*, bred from larvæ sent from Liverpool. By Mr. G. W. Wynn, a series of *Orthosia suspecta* from Sutton Park; *Chærocampa porcellus* (one) from Northfield; *Cymatophora duplaris* from Sutton; and *Lupe-rina cespitis*, *Eugonia erosaria* (a series), *Pterostoma palpina*, *Notodonta ziczac*, *Grapta c-album* (a series of the pale second brood), and *Cerura bifida*, all from Wyre Forest. By Mr. E. C. Rossiter, *Acherontia atropos* from Norfolk; *Bombyx rubi*, nice brown specimens, from the Hebrides; *Acidalia imitaria* from N. Wales; *Thecla w-album* from Arley, where he had discovered it on the railway bank between Arley and Highley; it has not hitherto been known in the Birmingham district, excepting by a chance specimen, but was not uncommon in this district; also *Cænonympha davus*, a series from the Hebrides; *Scodiona belgaria* from the Hebrides; and *Nudaria mundana* from Arley. By Mr. J. T. Fountain, a fine series of *Selidosema ericetaria* from the Dorsetshire coast; *Papilio machaon* bred from Wicken larvæ; *Colias edusa* from Knowle, and var. *helice* from Dorsetshire; and a long fine bred series of *Gortyna ochracea* from various spots near to

Birmingham. By Mr. P. W. Abbott, a specimen of *Leucania vitellina*, which was taken by Mr. John Hodges at Freshwater, Isle of Wight, at sugar, the night of Sept. 8th, during a thunderstorm. By Messrs. A. H. Martineau and C. J. Wainwright, a number of insects taken at Wyre Forest during a few days spent together there at Whitsuntide: they included among the Hymenoptera, *Pompilus viaticus* and *P. spissus*, *Osmia spinulosa*, and *Passalæcus gracilis*; among the Diptera, *Conops vesicularis*, *Doros conopseus*, *Dioctria atricapilla*, *D. ælandica*, a nice series of *Chrysotoxum sylvarum*, *Syrphus nitidicollis*, and *Pipizella virens*; among the Lepidoptera, *Hadena genistæ*, *Tephrosia extersaria*, *Lobophora viretata*, and *L. halterata*. Mr. Wainwright showed and presented a map of the Birmingham plateau, as delineated by Mr. G. H. Kenrick for adoption as the Society's district.

October 19th.—Mr. R. C. Bradley in the chair. Exhibits:—By Mr. Bradley, a specimen of *Antithesia salicella*, arranged in a natural position of rest on an oak leaf to show its striking resemblance to a bird excrement. Mr. W. Harrison, the six females of *Lasius umbratus* taken in Edgbaston, only about a mile and a half from the centre of Birmingham; this capture was all the more remarkable as Mr. Martineau had never met with it in the Midlands, and although it was not usually an uncommon species, yet he did not know of any other record of it near Birmingham; also a specimen of *Vanessa l-album*, which had been taken by Mr. B. May, of Moseley, about the year 1877, at rest on a tree-trunk at Henley in Arden; the capture was discredited at the time, but there seems not the slightest reason to doubt its genuineness. Mr. May has long since given up entomology, and parted with his collection, all but this one specimen. Mr. Harrison also exhibited a continental specimen for comparison; that from Henley was decidedly smaller and darker. By Mr. A. H. Martineau, an imago and full-grown larva of *Ammophila sabulosa*, obtained under the following singular conditions: his brother watched the wasp engaged in burrowing at Newquay; after he had seen it make its hole, fetch a larva and put it in, lay an egg with it, and then fill up the hole, he caught the wasp, and dug up the larva, which was a fat green Noctua, and placed them altogether in a match-box, where he left them and forgot them. Some time afterwards, chancing to open the box, he found the wasp, but the Noctua larva had quite disappeared, and in its place was a full-grown wasp larva, which had hatched and developed under these uncongenial conditions.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

NONPAREIL ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—October 15th, 1896.—Mr. Thos. Jackson in the chair. Exhibits:—By Mr. Hockett, living specimens of *Boarmia rhomboidaria*; and a live specimen of *Vanessa cardui*, which had only emerged that day. By Mr. Gurney, series of *Acronycta megacephala*. Mr. Harper, on behalf of Mr. Muncer, attracted a great deal of attention with a very fine variety of *Vanessa atalanta*, which he said had been bred from larvæ collected on the Hackney Marshes six weeks ago. The broad red band on the fore wings, which distinguishes the species, was quite straight in this specimen, and not semi-angular as in the type form, owing to the absence of one segment nearest the anal angle; the white spots on

the fore wings above the red band were much larger and not so clear in outline, making them appear as though they had been put on with chalk and then accidentally smudged; on the end of the band nearest the edge of the wing there was a white blotch; the red margin on the hind wings was devoid of the four black spots found on the usual form; at the foremost tip on the hind wings there was a clearly-defined white spot. By Mr. Lusby, four specimens of *Chrysophanus phlaeas*, in which the coppery gloss was of a very light hue; also showed several very small specimens of *Vanessa urticae*. A discussion ensued on the subject of the hybernation of *Vanessa cardui*. Mr. Norman stated that his brother had taken very small larvæ in the late autumn, which upon being subjected to a microscopical examination he made out to be *Vanessa cardui*, and this led him to think that the species hybernated in the larval stage.—F. A. NEWBERRY, *Reporting Secretary*.

OBITUARY.

JOSEPH CHAPPELL.—By the death of Joseph Chappell, on October 3rd last, Manchester loses a high authority on all matters pertaining to entomology, and Lancashire a fine example of the many working-men naturalists. For upwards of forty years he not only collected, but studied and observed, after the manner of the true naturalist, the insects of the Manchester district. Of the Lepidoptera and Coleoptera of this district his knowledge was great, and he afforded valuable assistance in furnishing records for Dr. Ellis's 'Catalogue of the Lepidoptera of Lancashire and Cheshire,' and Canon Fowler's 'Coleoptera of Great Britain and Ireland.' Mr. Chappell was gifted with a wonderful facility for discovering insects new to his district. His find of *Lymeaxylon navale* in Durham Park will occur to every coleopterist; whilst amongst a host of discoveries in the Lepidoptera he made out the life-history of *Sesia culiciformis* on Chat Moss, obtained *Notodonta bicolor* in Burnt Wood, and was the first to detect *Tapinostola elymi* as a British insect. The latter insect was considered to be only *Leucania pallens* by the collectors who took it on the east coast, but he recognising it as a new species, advised Mr. Thorpe to visit the locality, which was done, with the result that a good series was sent to the late Mr. Henry Doubleday, and the species added to the British list. For many years Mr. Chappell worked as a mechanic in Sir Joseph Whitworth's works. About twelve years ago he suffered the loss of one of his legs, which had to be amputated in consequence of disease. During the Jubilee Exhibition at Old Trafford he was in charge of the exhibition of living silkworm-moths. His geniality of disposition endeared him to all his friends and acquaintances, and the generosity with which he distributed duplicates of his captures made him known (by name if not personally) to all our leading entomologists. Mr. Chappell was an honorary member of the Lancashire and Cheshire Entomological Society. His extensive and valuable collections had recently been purchased by Mr. C. H. Schill. He was in his sixty-seventh year.

EXCHANGE.

Marked * are bred.

Duplicates.—Rhopalocera from New Hebrides, Malayana, India, Australia, &c.; Papilio, 100 species. *Desiderata*.—Papilionidæ, Parnassidæ, and Pieridæ; also Longicornes.—*J. Watson*; 94, George Street, Alexandra Park, Manchester.

Duplicates.—Scolieformis,* Alpina,* Myellus, Furcatellus. *Desiderata*.—Exigua, Albipuncta, Lapponaria; and other rarities and varieties of any kind, especially Caia and Grossulariata.—*T. Maddison*; South Bailey, Durham.

Duplicates.—Cespitis (fair), Umbratica, Verbasci, Pistacina, Cerago (2), Citrago (2), Rhomboidea (1), Libatrix, Triangulum (1), Advena (1 type), A. Urticæ (4), Jacobææ, Diluta (1), Betularia (1 male). *Desiderata*.—Numerous.—*J. H. Day Beales*; Wardington, Banbury.

Duplicates.—Russula (males), Ægon, Corydon, Carpinus, Sylvanus, Hyale, Agestis, Lupulinus, Ocellatus (pupæ). *Desiderata*.—Paniscus, Actæon, Arion, Cassiope, T. Pruni, T. Quercus, Lucina, and many others.—*C. B. Antram*; 54, Elgin Road, Addiscombe, near Croydon.

Duplicates.—Fuliginosa,* Bucephala,* Statices, Petraria, Multistrigaria, Aurantiaria. Variata, Plumbaria, Diluta, Rufina, Lota, Lunosa, Silago, Proteus, Flavicineta, Kühniella, and a few each of many others. *Desiderata*.—Types of the scarcer British Macros and Pyralides. Foreign specimens accepted.—*Geo. Wall*; Grim's Dyke, Harrow Weald.

Duplicates.—Davus, Obfuscata, Munitata, Fumata, Variata (dark vars.), Lignata, Cæsiata, Suffumata, Russata (Arran), Comitata, Strigillaria, Albulata, Bidentata, Velleda, Arcuosa, V-Aureum, Litura, Zellerii, Octomaculana, Ophthalmicana, Dimidiana, Stramineana, Icterana, Ferrugana. *Desiderata*.—Numerous.—*W. Smith*; 6, Buchanan Terrace, Paisley.

Duplicates.—Blandina, Artaxerxes, S. Populi,* Plantaginis,* Fuliginosa,* Carpinus,* Suffumata, Mensuraria, Rurea and var. Alopecurus, Polyodon (dark), Gemina, Literosa, Tenebrosa, Tritici, Festiva (vars.), Dahlii, Brunnea, Piniperda, Suspecta, Macilentata, Rufina, Litura, Vaccinii, Chi, Oxyacanthæ, Solidaginis, Instabilis, Gothica, Vetusta, Exoleta, Festucæ, Resinana,* &c. *Desiderata*.—Many common Geometers to enlarge series.—*Arthur Horne*; 52, Irvine Place, Aberdeen, N.B.

Duplicates.—Aglais, Euphrosyne, Selene, Statices, Mundana, Mesomella, Fumata, Strigillaria, Vulgata,* Absynthiata,* Assimilata,* Tenuiata,* Sobrinata,* Pumilata,* Rectangulata,* Sparsata,* Comitata,* Imbutata, L. Comma, Puta, Saucia, Rubricosa,* Munda, Cruda, Macilentata, Rufina, Vaccinii, Aprilina,* Umbratica, Unca, &c. *Desiderata*.—Other common species; on black pins only.—*G. A. Booth*; Preston.

Duplicates.—Pupæ of Strataria. *Desiderata*.—Cratægi, Hyale, C-Album, Iris, Epiphron and var. Cassiope, W-Album, Arion, Exulans, Chaonia, Dodonæa, Octogesima, Leporina, Nubeculosa, Præcox, Rubiginea, Sulphuralis, Parallellaria (Vespertaria), Laboraria, &c.; also numerous ova and pupæ. Only fine and medium-set insects accepted, with data and locality; black pins.—*G. R. Garland*; 94, Sedgwick Road, Leyton, Essex.

Duplicates.—Lubricipeda* var. Radiata and inter., Menthastri* var. Carbonaria inter. Ochracea, Viminalis* var. obscura, Russata* (dark), Rhomboidaria* (dark), Repandata* (black), Biundularia (dark), Pulveraria,* Sylvata, Tristata,* Suffumata,* Rubidata,* Comitata,* Subfulvata,* Templi (fair), Filigrammaria,* Connexa, Advenaria,* Dromedarius,* Hexapterata,* Prunata,* Hastata,* Sparsata, Fimbria,* Tortrices, &c.—*Jno. Harrison*; 7, Gawber Road, Barnsley.

Duplicates.—Blandina,* Atalanta,* Urticæ,* Capsophila* (fine), Capsincola,* Fulva, Plecta, Zonaria,* Arcuosa, Cruda, Fuliginosa,* Pamphilus,* Flavago,* Brassicæ,* Meticulosa,* Xanthographa, Litura, Lucipara,* Circellaris, Fulvago, a series of Philanthiformis (fair), Cæsiata (fair). *Desiderata*.—Fuciformis (narrow-bordered bee-hawk), Undulanus, Strigula, Centonalis, Sorocula, S. Urticæ, Ophiogramma, Captiuncula, Leucographa, Pyralinea, Chrysozona, Areola, Atriplicis, Triplasia, and many others.—*J. Thorpe*; Spring Gardens, Middleton, near Manchester.

Duplicates.—Irish: Sinapis, Argiolus, Aurinia,* Hyperanthus, Egeria, Paphia, Urticæ,* Napi, Rapæ, Alexis, Io,* Brassicæ,* Cardamines, Janira, Prunaria, Populata, Montanata, Mensuraria, Cratægata, Crepuscularia, Repandata, Elutata, Chærophyllata, Atomaria, Lunaria, Hectus, Russula (male), Festiva, Gemina, Pronuba (vars.), Gothica (vars.), Cruda, Oculea, Litura, Nebulosa, Orbona, Strigilis, Polyodon, Meticulosa, Blanda. English: Comma, Polychloros, Corydon, Adonis, Testudo, Lubricipeda. *Desiderata*.—Numerous.—*Rev. W. W. Flemming*; Coolfin, Portlaw, Co. Waterford.

Duplicates.—Iota, Pulchrina, Matura, Nigricans (very dark form), Capsophila,* Exoleta, S. Populi,* Potatoria,* Caia,* Umbratica, Ophiogramma* (few), Porcellus, C-Nigrum, Lithargyria, Thalassina, Littoralis, Elymi, Suspecta, Circellaris, Typica, Tenuiata,* Venosata,* Brumata, Bilunaria, Prunaria, Sordidata.* *Desiderata*.—Very numerous; must be on black pins, in perfect condition and well set, with data; pupæ wanted.—*Blundell Thornhill; Castle Cossey, Castle Bellingham, Ireland.*

Duplicates.—Papilio, Thaos, Philoscenes, Pamnon, Paris, Erithronius, Dissimilis, Antiphates, Sarpedon, Agamemnon, Cloanthus, Helenus, Apatura mahesa, Argynnis childreni, nephe, Lathonia, Cynthia arsinoë, C. avis, C. Helaris, Catop. orocale, Danais, Genutes chrysippus, Limniacæ, Erith. Lepidea, H. Mesippus, Bolina dubius, Hel. chautionias, Junonia almana, asterias, Orithya Lemonias, venone, Euploea core, Kall. macleis, Morpho Peleides, Parthenos vireus, S. Hipselus, Hippocle, Terias Hecabe, D. Livornica, P. apollo, C. Phicomene, &c.—*Rev. M. Hick; Trimdon Grange, R.S.O.*

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MEETINGS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—Wednesday, December 2nd, at 8 p.m.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.—Meetings on the 2nd and 4th Thursdays in each month, at 8 p.m. Paper to be read, December 10th, "A few notes on the N. American *Agestis subgothica*," by W. Mansbridge, F.E.S.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—The meetings of this Society (held at the London Institution, Finsbury Circus, E.C.) will take place on the 1st and 3rd Tuesdays in each month; from 7.30 to 10 p.m. as heretofore.

NORTH LONDON NATURAL HISTORY SOCIETY.—Meetings are held on the 2nd and 4th Thursdays in each month at the North East London Institute, Dalston Lane (close to Hackney Downs Station on the G.E.R.), from 7.45 to 9.30 or 10 p.m.

NONPAREIL ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, 90, MANSFIELD STREET, KINGSLAND ROAD, N.E.—Meeting nights, 1st and 3rd Thursdays in each month.

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Lichenaria, *Plumaria*, *Belgaria*, 3d.; *Fuciformis*, *Festucæ*, *Iota*, *Pulchrina*, 4d.;
Stramineata, *Sexalisata*, *Elymi*, *Australis*, *Aurago*, *Sponsa*, 5d.; *Roboraria*, 8d.

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